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Sarat Centenary College

Dhaniakhali, Hooghly

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Spatial Distribution of Population of Different Socio-Cultural Entities within Chandernagore Municipal Corporation Area

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Abstract: Urban settlement always attracts people from the surrounding areas as well as from different parts of the country depending on the socio-economic criteria of that urban centre. Urbanisation in the modern world flourished along with the industrial revolution. The wave from the European industrial revolution largely hit different parts of India too. A new set of towns emerged along with European traders cum rulers. These towns attracted people having different languages, religions, caste, etc., but common inertia found among themselves that they had unitedly lived in towns with a unique identity related to that soil. So the town like Chandernagore Municipal Corporation has always followed the same legacy and remained as a bouquet with different flowers of social, cultural entities. The spatial distribution of these people within this town is always determined by specific social-cultural reasons.

Keywords: social, cultural, language, caste, religion

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Oral Traditions for Retrieving History through Stories: A Reading of Jack Davis' *The Dreamers*

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Abstract: *The Dreamers* (1982) by Jack Davis is a story of a country-town family and old Uncle Worru, who, in his dying days, recedes from urban hopelessness to the life and language of the Nyoongah spirit which in him has survived 'civilisation. Davis uses this setting to depict Aboriginality through language and other aspects of Nyoongah life, like song, dance, religion or mythical yarns. Davis's use of oral tradition not only enlivens the past but also enriches the present. This article analyses how such oral traditions are employed by the playwright to retrieve stories about the Aboriginal past.

Keywords: Orality, myth, history, Aboriginality

'Orality' is

> a term used to denote an extended complex of elements associated with oral cultures – that is, cultures either unaffected by literacy and the written word or only marginally affected by them. (Hawthorn 246)

Romanuj Konar

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Dutta, Amar. "Arun Kolatkar's *Jejuri*: ..." pp. 118-129

Arun Kolatkar's Jejuri: A Conflict between Myth and Reality, Faith and Scepticism

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Abstract
Myth and mythical association with different gods and goddesses play a significant role in Indian English literature. Arun Kolatkar's *Jejuri* is a Commonwealth Writers' Prize winning collection of poems about a pilgrim place of the same name in Maharashtra and mythical stories associated with the local god Khandoba. Kolatkar tries to exploit the age old theme of a religious pilgrimage through his poetic persona, Monahar, who is a modern urban sceptic. To him Jejuri does not appear to be a spiritual place or a sacred place of worshipping God. Rather it is a barren, desolated and ruined place. This paper aims to analyze the conflict between the mythical association of the place and the god Khandoba and the socio-cultural and economic reality of the place; between the blind faith of the local people and the pilgrims who visit there and the sceptic attitude of an urban tourist with an objective eye and rational mind.

Keywords
pilgrimage, faith, scepticism, myth, conflict

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Effect of Gamma Rays on Various Physio-Morphological Characters in the M_1 Generation of Scented Rice

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Abstract Seeds of local scented rice cultivar Tulaipanja were germinated in the laboratory and sown in the pot immediately after treatment with 2 doses (200 Gy and 300 Gy) of gamma rays. Thirty-day old seedlings were transplanted in the main field. Biological effects of gamma irradiation on different physiological parameters related to growth and development were studied. The germination ability of treated seeds and growth and survival ability of seedlings were affected considerably. Significant reduction in the the length of radicle and plumule, plant height, number of panicles per plant and survival ability of plants was observed with increasing doses of gamma rays. The flowering was also delayed due to radiation treatment. The growth and development of plants was greatly impaired as reflected on different physio-morphological characters studied in the above scented rice cultivar.

Keywords Gamma rays, Induced mutation, M_1 generation, Scented rice.

Introduction

Induced mutation is an important complementary and often unique approach in plant breeding. The induced mutation can provide useful alternative to natural variation particularly to improve one or few easily identifiable characters of well adapted variety specifically in scented rice. Tulaipanja, a non-basmati traditional aromatic tall *indica* rice cultivar is very popular in northern parts of West Bengal, an important rice growing province of India, due to its excellent grain quality and aroma. But this cultivar is handicapped by low yield potential. Therefore, there is urgent need to improve the yield potential of such rice. However, improvement in yield and

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Table 1. Germination percentage, plumule length and radicle length in the M_1 generation.

Treatments	Germination percentage	After five days of germination: Plumule length (cm)	Radicle length (cm)	Percentage of reduction in respect of control: Plumule	Radicle
Control	98.0	1.58	2.9	–	–
200 Gy	89.4	1.58	1.92	0.00	33.79
300 Gy	80.2	0.77	1.01	51.26	65.17

Table 2. Plant height at different stages and survival percentage in the M_1 generation.

Treatments	% of survival ability at maturity	Mean height at 60 days (cm)	Mean height at 90 days (cm)	Mean height at 130 days (cm)	Range of height at maturity (cm)	% of reduction in height in respect to control
Control	84.50	50.43	109.90	136.46	102-162	–
200 Gy	82.14	52.34	114.07	138.34	100-175	1.38* (increase)
300 Gy	45.00	42.09	85.37	110.70	92-130	18.88

its component characters through hybridization and recombination often becomes difficult due to breakdown of aroma and cooking quality characters in such rice. Therefore, generation of variability through mutagenic treatments is important for improvement of this crop. An attempt has been made to study the various effects of two doses of gamma rays 200 Gy and 300 Gy on physio-morphological characters in the M_1 generation in the present investigation. Such knowledge would be helpful to improve the scented rice through induced mutation.

Materials and Methods

Dry, healthy and unhusked seeds with about 14% moisture were irradiated with 2 different doses of gamma rays, 200 Gy and 300 Gy. The irradiated seeds following gamma rays treatment along with control were soaked with water for 48 h at room temperature for germination. Data on germination percentage, length of radicle and plumule were recorded. The seeds were sown in pots and single seedling per hill was transplanted in the field with a spacing of 20 cm × 50 cm. Standard cultural practices were followed to raise a good healthy crop. Number of plants survived was recorded after 1 month of transplantation and also at maturity. Data on plant height, number of panicles per plant, heading time and spikelet fertility were recorded in the M_1 generation.

Results and Discussion

In the present investigation, germination was affected following gamma ray treatment (Table 1). The percentage of germination was 89.40% in 200 Gy and 80.20% in 300 Gy as compared to 98% in control. The reduction in the per cent of germination was higher in the higher dose. Reduced germination in induced rice mutant was reported. (Kumar et al. 2013, Cheema and Atta 2003). Reduced germination might be due to higher physiological damage in seeds resulting from inhibition of auxin synthesis (Gordon 1955) and catalase, peroxidase and cytochrome oxidase (Klinhofs et al. 1974).

Growth and survival of the seedlings were affected adversely. Retardation of growth and survival of plants raised from irradiated seeds is a common phenomenon and has been widely used as an index in assessing the biological effects of various physical and chemical mutagens (Konzak et al. 1972). Considerable reduction in the length of radicle and plumule was observed in the higher dose of 300 Gy (Table 1). Cheema and Atta (2003) observed decrease in germination and seedling height with the increase in radiation dose. Reduction in seedling growth could be attributed to inhibitory action of enzymes and changes in the enzyme activity due to γ-irradiation.

Significant reduction (18.88%) in plant height was recorded in the higher dose of 300 Gy as compared to the control and slight increase in plant height over control was observed in the dose of 200 Gy (Table 2). Imam and Chakraborty (2018) reported that plant height decreased with increase in doses of gam-

Table 3. Range and mean number of panicles per plant in the M_1 generation.

Treat-ments	Frequency of plants in different classes							Mean number of panicles per plant
	0-20	21-30	31-40	41-50	51-60	61-70	71-80	
Control	7	23	39	25	6	–	–	35.90
200 Gy	21	41	27	6	5	–	–	28.25
300 Gy	14	20	26	14	9	5	2	26.44

ma radiation. Various explanations have been offered for growth inhibition due to mutagenic treatments like auxin destruction (Joshi and Gour 1974) or inhibition of auxin synthesis, disbalance in the maintenance of nutritional level, failure of assimilatory mechanisms, inhibition of mitosis and chromosomal damage with associated physiological chages (Riley 1953).

The survival of M_1 plants showed a gradual reduction with increasing doses of gamma rays while highest reduction in survival of 45% was observed in 300 Gy as compared to 82.14% in 200 Gy and 84.50% in control (Table 2) . Kumar et al. (1997) observed that mutagen treatment in rice showed reduced seedling survival in the M_1 generation.

The effect of irradiation was also manifested in the reduction in the number of panicles per plant as the frequency of plants with higher number of panicles was significantly higher in control than the two doses of radiation (Table 3). However, some plants in 300 Gy had increased number of panicles. Similar results were also reported (Imam and Chakraborty 2018). Increase in panicle number might have resulted from stimulatory effect of mutagen (Chakraborty and Kole 2008).

Flowering was delayed considerably in both the doses as compared to control (Table 4). More than 50% plants in both the doses of gamma rays came to flowering after 120 days, while the flowering was completed within 120 days in more than 90% plants in control. Delayed flowering due to radiation was also observed (Sharma 1986).

The reduction in spikelet fertility was observed, as the percentage of plants with more than 50% spikelet sterility was 27.39 and 63.33 in the doses of 200 Gy and 300 Gy, respectively (Table 5). The higher spikelet sterility (%) may be due to higher pollen sterility. Mutagenic treatments generally reduced the reproductive ability of plants and increased the number of sterile spikelets in panicles (Imam and Chakraborty 2018).

In general, the results indicates that the growth of M_1 plants was greatly impaired as seen from the reduction in the length of radicle and plumule, number of panicles per plant, plaant height in association with the delayed flowering and spikelet sterility which may be due to various biochemical and physiological changes after radiation. The mutational changes observed in the M_1 generation need to be studies in the M_2 and later generations for understanding radiation induced changes in the genetic architecture in this scented rice (Imam and Chakraborty 2018). The irradiated populations may be advanced by growing plant -progeny rows for selection of superior mutant plants following pedigree method in later generations.

Table 4. Range and mean number of days to flower in different treatments of gamma rays in the M_1 generation.

Treat-ments	Number of plants with duration of flowering (in days)				Mean days to flower
	110-115	116-120	121-125	126-130	
Control	22	142	5	NIL	117.36
200 Gy	11	77	108	34	121.54
300 Gy	8	25	43	14	121.41

Table 5. Spikelet sterility in different treatments of gamma rays in the M_1 generation.

Treat-ments	Number of plants in different spikelet sterility classes expressed as percentage					% of plants with more than 50% spikelet sterility
	51-60	61-70	71-80	81-90	91-100	
Control	NIL	NIL	NIL	NIL	NIL	–
200 Gy	32	7	10	8	6	27.39
300 Gy	12	2	3	8	12	63.33

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Evaluation of Performance in the Crosses of Aromatic Rice Involving Induced Mutants

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ABSTRACT

An investigation was made on six basic generations viz., P_1, P_2, F_1, F_2, BC_1 and BC_2 of five cross-combinations which were grown in randomized complete block design with three replications to evaluate the performance of different characters in various generations. Observations were made on various morphological and physiological characters which would be useful for obtaining an idea on genetic nature and performance of crosses for the improvement of aromatic rice. In general, the mean performance of F_1 for different characters was in between two parents, while in some cases, it exceeded the better parent. The F_2 plants showed wide range of variability for each character studied. In many cases, the mean of BC_1 and BC_2 plants approached the respective recurrent parent. Wide range of variability was present in the population studied. The information obtained from this investigation would be useful for the improvement of aromatic rice.

Key words *Mean performance, quantitative characters, induced mutants, aromatic rice*

Rice is the most important staple food and also the predominant dietary energy source for various countries in the world. It is the most important food grain in respect to nutrition and calories, contributing more than one-fifth of the calories consumed worldwide by humans (Smith 1998). Aromatic rice has a special place in the world rice market. There is an increasing demand of high yielding aromatic rice with superior grain quality. Evaluation of performance of important traits including grain yield is the prerequisite for successful breeding strategies in aromatic rice. In the breeding programme, it is desirable to have an idea about the performance of different generations of the characters to be improved. Nature of variability in the populations is also important for genetic improvement of aromatic rice. To consider the above mentioned facts, an investigation on different generations of five cross combinations of aromatic rice involving induced mutants of local aromatic cultivars was made for the improvement of aromatic rice and also to formulate the appropriate breeding strategy.

MATERIALS AND METHODS

Gobindabhog and Tulaipanja are popular tall *indica* short grain aromatic non-basmati rice grown in West Bengal, which are susceptible lodging with low yield potential. Induced mutation through gamma irradiation resulted in a number of short height mutants and selection in advanced generation resulted in isolation of a number of true-breeding mutants. The induced true-breeding mutant IET 13541 derived from Gobindabhog (Ghosh and Ganguli 1994; Hasib and Ganguli 2005) and IET 14143 and IET 14142 derived from Tulaipanja (Basak *et al* 1995; Hasib and Ganguli 2005) retaining the characteristics aroma of mother plants were used in cross-breeding programme with three popular basmati varieties to generate five cross-combinations (Table 1). Plants of six basic generations namely, Parent1 (P_1), Parent 2 (P_2), F_1 ($P_1 \times P_2$), F_2 (selfing of F_1), BC_1 ($F_1 \times P_1$) and BC_2 ($F_1 \times P_2$) were grown in randomized complete block design with three replications adopting appropriate spacing in warm wet session. Standard agronomic practices were followed to raise the healthy plants of all six generations, *viz.*, P_1, P_2, F_1, F_2, BC_1 and BC_2 together in a single session. Data on important morphological and physiological characters like plant height, days to flowering, spikelet number per plant, grain length, grain breadth, dry matter production per plant, harvest index and grain yield per plant were recorded. The data collected from the six basic generations, *viz.*, P_1, P_2, F_1, F_2, BC_1 and BC_2 of five cross-combinations for different important morphological and physiological characters were considered for the estimation of mean performance and genetical interpretations for the improvement of aromatic rice.

RESULTS AND DISCUSSION

The mean performance of six basic generations of five cross combinations obtained from growing in single warm wet session is presented in Table 1.The results are described as below:

Plant height: The mean plant height of F_1 plants exceeded both the parents in all the crosses as was observed earlier by El-Lattef Abd *et al* (2012) and Elkhoby *et al* (2014) which indicated high hybrid vigour. The performance of F_1 plants also exceeded the F_2 plants in all the crosses as noticed earlier by Buu and Tao (1992). The F_1 mean also exceeded the mean values of two back crosses as was also recorded by El-Lattef Abd *et al* (2012). The means of BC_1 generation were greater than their respective recurrent parent for most of the crosses. The BC_2 plants were taller than their respective recurrent parent in all crosses except I ET 14143 × Basmati 370.

Days to flowering: The F_1 plants were found to be almost equal to the mid-parental values in all the crosses. The results are in agreement with El-Lattef *et al* (2012). The performance of F_1 plants was also very close to the respective F_2 means in all crosses. The BC_1 means were less than their respective recurrent parent as was recorded earlier by Ahmadikhah (2010). The means of BC_2 were greater as compared to their respective recurrent parent. The F_2 mean value was greater than the F_1 for days to flowering in IET 14142 × Pusa Basmati I indicating transgressive segregation.

Grain number per plant: The mean performance of F_1

Table 1. Mean performance of six generations for eight important quantitative characters in five crosses of rice

Cross combinations	P_1	P2	F_1	F_2	BC_1	BC_2
			Plant height (cm)			
IET 14143 ×Basmati-370	110.62 ± 0.35	146.50 ± 0.53	155.78 ± 1.61	132.32 ± 1.94	130.69 ± 4.04	145.38 ± 1.44
IET 14143 × Pakistan Basmati	110.62 ± 0.35	152.87 ± 1.06	161.03 ± 0.84	126.32 ± 2.03	135.61 ± 2.37	157.40 ± 2.19
IET 14142 × Pusa Basmati-I	102.62 ± 0.63	112.57 ± 0.63	152.22 ± 1.06	129.63 ± 0.81	143.43 ± 8.41	135.10 ± 2.54
IET 13541 × Basmati-370	141.42 ± 0.42	146.50 ± 0.53	164.84 ± 0.65	146.49 ± 0.24	153.82 ± 3.81	150.71 ± 2.61
IET 13541 × Pusa Basmati-I	141.42 ± 0.42	112.57 ± 0.63	161.00 ± 0.86	132.37 ± 1.60	139.72 ± 4.07	130.27 ± 2.26
			Days to flowering			
IET 14143×Basmati-370	127.27 ± 0.35	99.30 ± 0.27	116.63 ± 0.48	115.78 ± 1.32	122.27 ± 0.71	108.84 ± 0.82
IET 14143 × Pakistan Basmati	127.27 ± 0.35	114.83 ± 0.18	122.18 ± 0.40	119.95 ± 0.63	125.52 ± 0.37	118.40 ± 0.50
IET 14142 × Pusa Basmati-I	127.80 ± 0.26	109.40 ± 0.52	122.33 ± 0.35	123.29 ± 0.35	125.27 ± 0.53	116.37 ± 0.42
IET 13541 ×Basmati-370	122.97 ± 0.33	99.30 ± 0.27	112.72 ± 0.32	112.65 ± 0.32	119.36 ± 0.52	107.53 ± 0.45
IET 13541 × Pusa Basmati-I	122.97 ± 0.33	109.40 ± 0.52	119.56 ± 0.39	119.07 ± 1.32	121.40 ± 0.52	114.53 ± 0.38
			Grain number/plant			
IET 14143 × Basmati-370	113.61 ± 1.13	53.58 ± 1.19	101.11 ± 1.81	85.56 ± 1.69	102.52 ± 2.87	78.33 ± 3.21
IET 14143 × Pakistan Basmati	113.61 ± 1.13	73.91 ± 1.04	104.25 ± 1.08	85.18 ± 4.44	105.74 ± 3.83	86.76 ± 1.31
IET 14142 × Pusa Basmati-I	78.24 ± 0.80	75.61 ± 1.03	94.62 ± 1.19	89.27 ± 4.99	82.26 ± 2.35	76.70 ± 6.30
IET 13541 × Basmati-370	204.23 ± 1.63	53.58 ± 1.19	125.47 ± 0.50	101.32 ± 3.37	139.55 ± 3.79	75.55 ± 3.26
IET 13541 × Pusa Basmati-I	204.23 ± 1.63	75.61 ± 1.03	134.39 ± 1.40	124.00 ± 4.14	141.58 ± 4.95	87.21 ± 5.19
			Grain length (mm)			
IET 14143 × Basmati-370	7.81 ± 0.01	11.01 ± 0.01	9.59 ± 0.05	9.09 ± 0.11	8.74 ± 0.09	10.07 ± 0.02
IET 14143 × Pakistan Basmati	7.81 ± 0.01	10.47 ± 0.01	9.31 ± 0.02	9.06 ± 0.03	8.62 ± 0.09	9.90 ± 0.03
IET 14142 × Pusa Basmati-I	7.76 ± 0.01	10.69 ± 0.02	9.05 ± 0.02	8.69 ± 0.05	8.59 ± 0.09	9.67 ± 0.14
IET 13541 × Basmati-370	5.78 ± 0.01	11.01 ± 0.01	7.84 ± 0.08	7.71 ± 0.11	7.08 ± 0.11	9.70 ± 0.27
IET 13541 × Pusa Basmati-I	5.78 ± 0.01	10.69 ± 0.02	8.03 ± 0.03	7.76 ± 0.15	6.98 ± 0.06	9.51 ± 0.21
			Grain breadth (mm)			
IET 14143 × Basmati-370	2.12 ± 0.01	2.23 ± 0.01	2.20 ± 0.01	2.17 ± 0.01	2.15 ± 0.02	2.22 ± 0.01
IET 14143 × Pakistan Basmati	2.12 ± 0.01	2.30 ± 0.01	2.28 ± 0.01	2.27 ± 0.01	2.14 ± 0.01	2.30 ± 0.03
IET 14142 × Pusa Basmati-I	2.07 ± 0.01	2.19 ± 0.01	2.22 ± 0.01	2.17 ± 0.02	2.13 ± 0.01	2.15 ± 0.03
IET 13541 × Basmati-370	2.39 ± 0.01	2.23 ± 0.01	2.29 ± 0.01	2.26 ± 0.02	2.25 ± 0.02	2.22 ± 0.01
IET 13541 × Pusa Basmati-I	2.39 ± 0.01	2.19 ± 0.01	2.27 ± 0.01	2.22 ± 0.01	2.21 ± 0.02	2.19 ± 0.03
			Dry matter production/plant (gm)			
IET 14143 × Basmati-370	78.36 ± 1.69	60.67 ± 2.53	128.27 ± 2.18	74.91 ± 3.47	107.63 ± 3.09	113.44 ± 2.97
IET 14143× Pakistan Basmati	78.36 ± 1.69	75.53 ± 2.92	136.48 ± 2.43	90.73 ± 5.07	118.18 ± 4.40	131.82 ± 2.99
IET 14142 × Pusa Basmati-I	97.37 ± 2.53	50.11 ± 2.26	133.40 ± 2.67	87.12 ± 4.68	119.57 ± 3.82	117.29 ± 3.43
IET 13541 × Basmati-370	87.11 ± 2.51	60.67 ± 2.53	143.68 ± 2.32	84.79 ± 3.31	137.57 ± 3.13	108.57 ± 4.00
IET 13541 × Pusa Basmati-I	87.11 ± 2.51	50.11 ± 2.26	109.38 ± 2.12	93.15 ± 3.65	94.10 ± 2.46	91.81 ± 3.23

Contd.....

Cross combinations	P_1	P2	F_1	F_2	BC_1	BC_2
			Harvest index (%)			
IET 14143 × Basmati-370	30.09 ± 0.28	22.79 ± 0.48	28.35 ± 0.62	29.56 ± 1.04	31.26 ± 1.04	25.00 ± 0.98
IET 14143 × Pakistan Basmati	30.04 ± 0.28	20.44 ± 0.73	29.82 ± 0.23	31.42 ± 0.91	28.94 ± 0.86	25.39 ± 0.75
IET 14142 × Pusa Basmati-	22.83 ± 0.41	28.71 ± 0.22	24.50 ± 0.33	29.83 ± 2.31	24.95 ± 0.60	25.15 ± 1.15
IET 13541 × Basmati-370	28.41 ± 0.57	22.79 ± 0.48	24.57 ± 0.44	22.65 ± 0.94	22.98 ± 1.14	22.44 ± 0.81
IET 13541 × Pusa Basmati-I	28.41 ± 0.57	28.71 ± 0.22	32.43 ± 1.05	28.69 ± 0.83	32.76 ± 1.36	31.20 ± 1.32
			Grain yield/plant (g)			
IET 14143 × Basmati-37	23.55 ± 0.72	13.85 ± 0.88	36.38 ± 1.31	22.08 ± 0.40	33.61 ± 0.93	28.40 ± 1.69
IET 14143 × Pakistan Basmati	23.55 ± 0.72	15.48 ± 1.14	40.69 ± 0.73	28.49 ± 1.64	34.19 ± 1.50	33.51 ± 1.72
IET 14142 × Pusa Basmati-1	22.25 ± 0.97	14.39 ± 0.73	32.17 ± 1.07	25.81 ± 1.11	29.86 ± 1.46	29.54 ± 1.95
IET 13541 × Basmati-370	24.77 ± 1.17	13.85 ± 0.88	35.32 ± 1.15	19.14 ± 0.14	31.68 ± 2.27	24.32 ± 0.64
IET 13541 × Pusa Basmati-I	24.77 ± 1.17	14.39 ± 0.73	36.48 ± 0.84	26.70 ± 1.08	30.81 ± 1.38	28.69 ± 1.89

plants was greater than the mid-parental values in two crosses of IET 14143 with Basmati 370 and Pakistan Basmati. The F_1 hybrids had larger number of grains as compared to better parent in IET 14142 × Pusa Basmati-I. Sultan et al (2014) made similar observations in two crosses of rice. The performance of F_1 hybrids involving IET 13541 as a parent was more or less close to the mid-parental values. The mean performance of F_2 generation was quite inferior to F_1 as noticed earlier by Buu and Tao (1992). The mean performance of BC_1 plants was superior to the BC_2 plants. Similar results were obtained by El-Lattef Abd *et al* (2012).

Grain length: The mean grain length of F_1 hybrids was in between the respective parents in all the crosses. The F_1 values exceeded the mid-parental values in two hybrids involving IET 14143 as a parent. The mean grain lengths of F_1 plants were longer than their respective F_2 and BC_2 plants, whereas, the means of F_1 plants were less than the BC_2 plants in all the crosses. The performance of F_2 plants was superior to the respective BC_1 plants. The BC_1 generations showed an improvement in grain length than their respective recurrent parent in each cross. The mean grain length of BC_2 plants was shorter than the long grain parent.

Grain breadth: The F_1 hybrids had means in between the two parents in all but the cross IET 14142 × Pusa Basmati-I which showed greater value than the parents. The F_1 means exceeded the respective mid-parental values in two crosses of IET 13541 and these were also greater than the respective F_2 and BC_1 plants in all the crosses. The means of BC_2 were greater than the recurrent parents in three crosses involving IET 14143 or IET 14142 as a parent, but less in two crosses involving IET 13541 as parent.

Dry matter production per plant: The F_1 hybrids showed an improvement over respective better parent in all the five crosses indicated heterobeltiosis. The F_2 plants also showed an improvement over both the parents in two crosses viz., IET 14143 × Pakistan Basmati and IET 13541 × Pusa Basmati-I and it approached the better parent in three other crosses. The means of BC_1 and BC_2 generations exceeded the respective recurrent parent and the F_2 generation except IET 13541 × Pusa Basmati-I which had BC_2 mean less than the F_2 mean.

Harvest index: Two crosses of IET 14143 with Basmati 370 and Pakistan Basmati had F_1 mean values which were close to the means of respective better parent, while the F_1 means exceeded the better parent in IET 13541 × Pusa Basmati-I which indicated heterobeltiosis. The F_2 means exceeded the respective better parent and also the F_1 hybrids in two crosses, viz., IET 14143 × Pakistan Basmati and IET 14142 × Pusa Basmati-I indicating transgressive segregation whereas it was very close to the means of respective better parent in two crosses of IET 14143 × Basmati 370 and IET 13541 × Pusa Basmati-I. The BC_1 means were greater than the respective recurrent parent in three crosses like IET 14143 × Basmati 370, IET 14142 × Pusa Basmati-I and IET 13541 × Pusa Basmati-I, while it is less in rest two crosses. The BC_2 means were greater than respective recurrent parent in all the crosses except IET 14142 × Pusa Basmati-I and IET 13541 × Basmati 370. The means of BC_1 were better than that of BC_2 generation in each cross except IET 14142 × Pusa Basmati-I.

Grain yield per plant: The performance of F_1 hybrids in all the crosses exceeded the respective better parent which indicated heterobeltiosis. Similar results were obtained earlier by El-Lattef *et al* (2012), Elkhoby *et al* (2014), Sultan *et al* (2014) and Jhansirani *et al* (2015). It also exceeded the means of F_2, BC_1 and BC_2 in all the crosses. Similar results were reported by Buu and Tao (1992) and Jhansirani *et al* (2015). The means of the F_2 plants were also greater than the respective better parent in three crosses viz., IET 14143 × Pakistan Basmati, IET 14142 × Pusa Basmati-I and IET 13541 × Pusa Basmati-I and approached closely to the respective better parent in IET 14143 × Basmati 370. The means of BC_1 were greater than the respective recurrent parent as was noticed earlier by Ahmadikhah (2010). The BC_2 generation showed an improved mean performance over

their respective recurrent parent in all the cross-combinations as was observed earlier by El-Lattef *et al* (2012).

In general, the performance of F_1 was better than their parents or the performance F_1 was greater than the means of two parents in all the crosses for studied characters. These results indicated the presence of partial and over-dominance for these traits which is in agreement with Elkhoby *et al* (2014). The mean performance of almost all the traits was less in F_2 than F_1 and the respective better parent. The back crosses to the high scoring parent produced greater values than back crosses to the low scoring parent in most of the cases which may be helpful for selection purposes. These results are in agreement with Buu and Tao (1992). The investigation also revealed a wide range of variability present in the population of different segregating generations that may be utilized in the breeding programme for the improvement of aromatic rice through selection of promising high yielding segregants retaining the characteristics aroma and other quality characters associated with such rice.

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Original Research Paper

Commerce

CONTRIBUTION OF FOREIGN DIRECT INVESTMENT AND FOREIGN PORTFOLIO INVESTMENT IN INDIAN ECONOMY: A COMPARATIVE STUDY

Nabanita Pal Assistant Professor in Commerce Sarat Centenary College, Dhaniakhali

ABSTRACT Foreign Direct Investment and Foreign Portfolio Investment have gained a significant role in Indian Capital Markets and its economy also. FIIs were permitted to invest in all the listed securities traded in Indian Capital Market for the first time in September 1992. As per the RBI, report on currency and finance (2003-04), since 1991 there has been continuous move towards the integration of the Indian Economy with World Economy. At the beginning of liberalization (1991) FDI and FPI flows to India have steadily grown in importance any economy in the world is major affected by the foreign investments and movement of its foreign capital as an indicator of performance of its various sectors in a particular industry. The don of 21st century has shown a real dynamism of stock market and the various benchmarking of sensitivity index (sensex) in terms of its highest peaks and sudden falls. A well developed stock market has its impact on the development of economy. This study is based on 16 years data from 2000 to 2016.

KEYWORDS : Foreign Direct Investment, Foreign Portfolio Investment, Total Foreign Investment, equity inflows, Liberalization.

INTRODUCTION

Foreign Direct Investment (FDI) is an investment directly into production and services in a country by a company located in another country, either by buying a company or by expanding business in that country. It is another mode of doing business in a foreign country (P Subba Rao 2009). A well-recognized stock market of any country has considered being an important part on the development on the economy. Returns on the stock market are combination of domestic as well as foreign investments. Financial system of any country which is inevitable constituent of economy facilitates mobilization of resources through financial markets. Stock exchange is one of the corporate secondary financial market which enables buying and selling of corporate shares or debentures. The article focuses on contribution made by foreign portfolio investment (FPI) and foreign direct investment (FDI) on Indian capital market.

Domestic or local investors seize greater knowledge about Indian financial markets than that of foreign investors who belongs to some other country. Stock market provides investors large number of scripts with huge degree of risk, return, and liquidity. There are wide range of options among the investors whether domestic or foreign investors in terms of asset which inducing more savings, increased competition, enhanced risk elements as well as enhanced the Gross Domestic Products (GDP) of the country, which is important indicator of a growing economy. Foreign capital plays significant role for every national economy, regardless of its level of development.

India has experienced fiscal and balance of payment crisis in 1990-91. In response, it embarked on the path of liberalization in 1992. During this era, for the first time permitted Foreign Institutional Investment (FII) to invest in all listed securities of Indian capital market in 14th September, 1992 to reduce country dependence on debt creating capital flows, correct the accurate balance of payment crisis and develop capital markets. FPI are considered to be an important part of a stock market movement. FIIs are termed as hot money which increases the inflow with in the country and contributed towards the volatility of BSE sensex. Inflow of foreign capital brings foreign currency into the country which contributes towards the development of the economy but large portion of capital in stock market comes through domestic route, in which Foreign Direct Investments play significant role.

LITERATURE REVIEW

- Klaus E Meyer (2005), in his paper "Foreign Direct investment in Emerging Economies" focuses on the impact of FDI on host economies and on policy and managerial implications arising from this (potential) impact. The study finds out that as emerging economies integrate into the global economies international trade and investment will continue to accelerate. MNEs will continue to act as pivotal interface between domestic and international market stand their relative importance may even increase further.
- Rajalakshmi K. and Ramachandran F., (2011), "Impact of FDI in India's automobile sector with reference to passenger car segment." The author has studied the foreign investment flows through the automobile sector with special reference to passenger cars. The research methodology used for analysis includes the use of ARIMA, coefficient, linear and compound model. The period of study is from 1991 to 2011. This paper is an empirical study of FDI flows after post liberalisation period. The author has also examined the trend ad composition of FDI flow and the effect of FDI on economic growth.
- Singh Kr. Arun and Agarwal P.K., (2012), "Foreign direct investment: The big bang in Indian retail". In this article they have studied the relation of foreign investment and Indian retail business. The author discusses the policy development for FDI in the two retail categories: single brand and multi brand. The author concludes that FDI in multi brand retail should be considered better technology and employment, that openness of FDI in India would help India to integrate into worldwide market.
- Sharma Reetu and Khurana Nikita (2013), in their study on the sector-wise distribution of FDI inflow to know about which has concerned with the chief share, used a data from 1991-92 to 2011-2012 (post-liberalization period). This paper also discusses the various problems about the foreign direct investment and suggests the some recommendations for the same. In this study found that, Indian economy is mostly based on agriculture. So, there is a most important scope of agriculture services. Therefore, the foreign direct investment in this sector should be encouraged.

OBJECTIVES OF THE STUDY

1. To determine contribution made by Foreign Direct Investment on different sectors in India.
2. To determine contribution made by Foreign Direct Investment and Foreign Portfolio Investment in Indian economy.
3. A comparative analysis on FDI and FPI investment inflows.

Hypothesis of the study

- FDI and FPI inflows show a positive growth trend over the period from 2000 to 2016.

RESEARCH METHEDOLOGY

The present study is both explorative and empirical in nature. The explorative part is supported by various articles, literatures, published in news paper viz. Economic Times, Business Standard etc. And journals of national and international repute. Some information has also been gathered from different reference books and academic websites available in the area of study. Empirical part

ISSN- 2394-5125 VOL 6, ISSUE 06, 2019

ROLE OF GRAM PANCHAYAT FOR RURAL POVERTY ALLEVIATION THROUGH GOVERNMENT SCHEMES- A CASE STUDY IN GOPINATHPUR-I GRAM PANCHAYAT, DHANIAKHALI, HOOGHLY, WEST BENGAL

Basudev Halder, Assistant Professor of Geography, Sarat Centenary College, Dhaniakhali, Hooghly<halder.basudev22@gmail.com>

Submitted : 16.11.2019 Revised : 03.12.2019 Accepted : 18.12.2019

Abstract: Poverty is a curse for human society, particularly now-a-days, when India is achieving much in space-science also. Most of the Indian population live in rural areas, so we can't ignore the institutional responsibilities for eradicating rural poverty. For present research work Gopinathpur-I Gram Panchayat under Dhaniakhali CD Block of Hooghly District has been taken into consideration. Panchayat is the micro-level institution which is the representative of the Government and the implementing authority of all the grass root level projects adopted by the Government. Through the survey work it can be clearly seen that the institutional participation is vibrant for rural poverty alleviation in the study area.
Keywords: Poverty, rural, Panchayat, alleviation

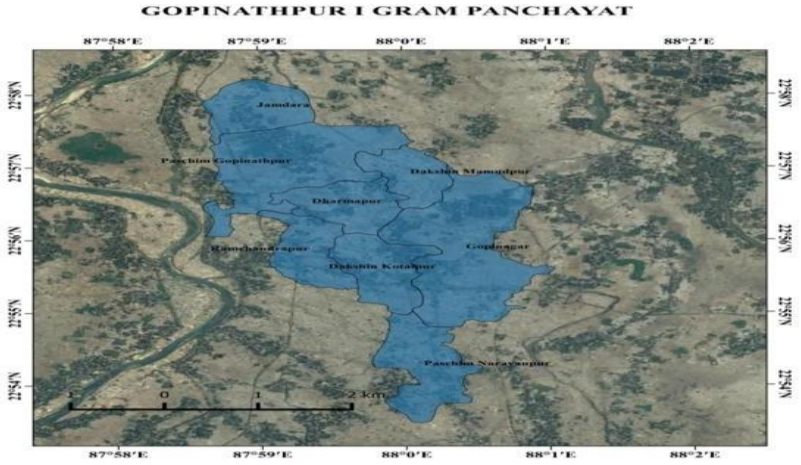
Introduction:

In Indian Constitution under its Directive Principal of State Policy in Article 38 it is clearly mentioned that state shall promote the welfare of the people in terms of justice, social, economical and political perspective. It has also been mentioned that state shall also minimise the inequalities in income and endeavour to eliminate inequalities in status, facilities and opportunities. Article 40 emphasises for formation of village panchayat with such power and authority as may be necessary to enable them to function as units of self-government (Mukherjee & Mukherjee 2008).

The Gram Panchayat is the lowest layer in three tier rural administration system. It has been empowered to identify the beneficiaries for different schemes and programmes of the government. Here Gopinathpur-I Gram Panchayat is found to be playing the same role as mentioned in Indian Constitution and following the instructions as per Government of India and Government of West Bengal. Several governmental schemes, like Indira AawasYojona, MGNREGA, Indira Gandhi National Old Age Pension Scheme etc. are running for eradicating rural poverty.

Study area:

Gopinathpur-I Gram Panchayat has been selected as the study area. It is under the jurisdiction of Dhaniakhali Block of Hugli district, West Bengal. The Panchayat area is constituted by eight mouzas viz., Dakshin Kotalpur (J.L. no. 53), Dakshin Mamudpur (J.L. no. 44), Dharampur (J.L. no. 45), Gopinagar (J.L. no. 43), Jamdara (J.L. no. 47), Pachim Gopinathpur (J.L. no. 46), Pachim Narayanpur (J.L. no. 55), and Ramchandrapur (J.L. no. 52). Total area of the Panchayat is 1322.87 hectors (Census, 2011).



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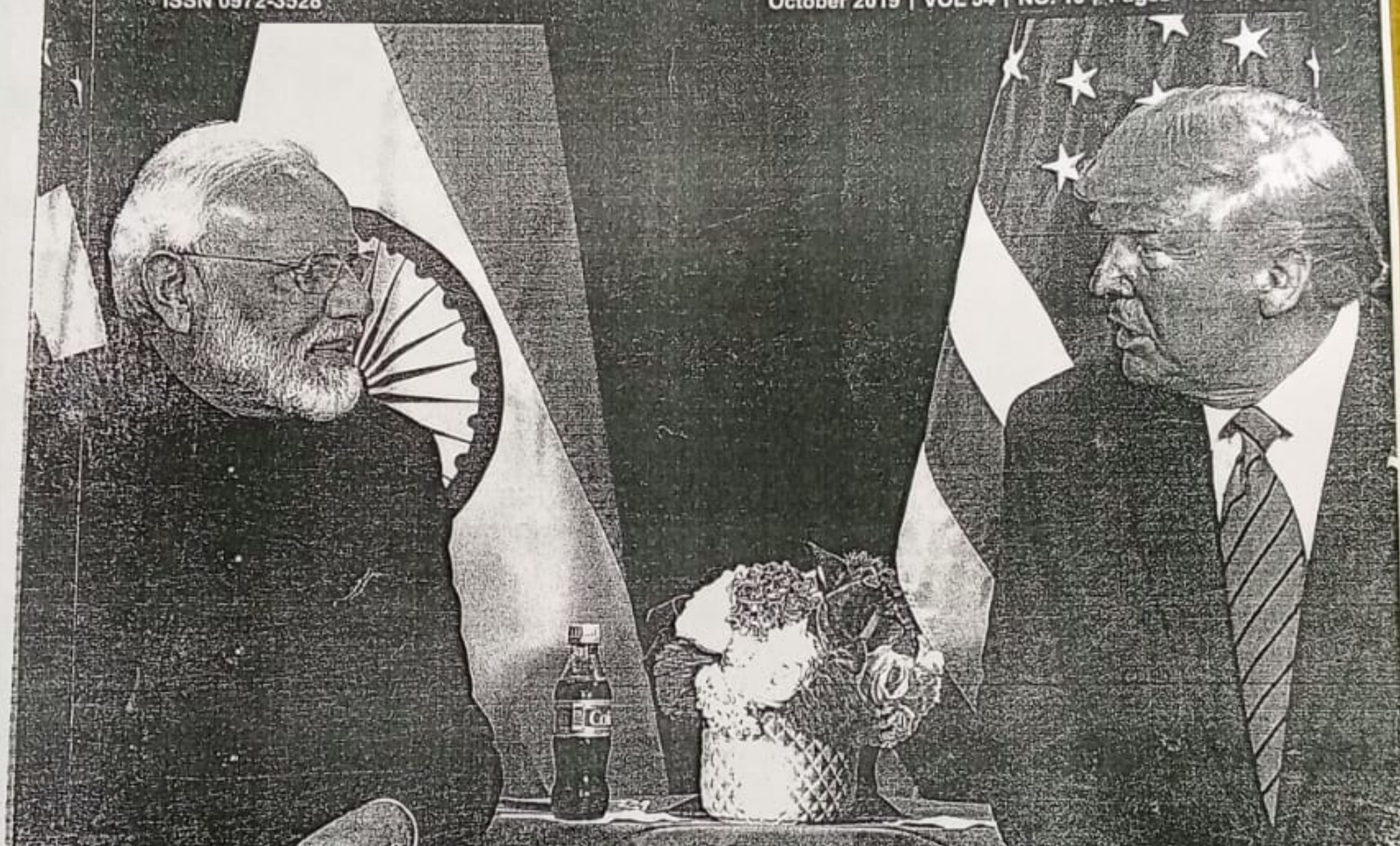

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COVER STORY

FINANCIAL INNOVATION IN THE MSME SECTOR: AN EMPIRICAL STUDY ON FIN-TECH

Dr. Rintu Nath
HoD & Assistant Professor
Department of Commerce
Sarat Centenary College, Dhaniakhali, Hooghly

Abstract

MSME sector is considered as power house of every emerging economy including India. Despite its significant contribution, the sector is facing massive problems relating to finance specifically. The purpose of this study is to review and to evaluate fintech revolution and its impact on MSME sector. Fintech is doing pioneering work in the money market. A special segment of banking industry is to provide financial support to the MSME sector. Fintech is developing tailor made solutions in the way of promoting Apps exclusively for fast approval of finance digitally to various segments including MSMEs.

Background

In general, significantly people in India are not habituated to accustom in digital transactions due to excess liquid money is circulated in the economy. It has cascading effect on inflation to move up and discouraged to cash less society on the other. Digital threats, inadequate infrastructure to accept debit and credit cards, linkage failure and no actions in case of post digital threats are considered as key concerns from users' point of view. Besides, awareness level to use several electronic mechanisms is one of the key constraints in rural and semi-urban areas. Thereby, financial sector reforms in India were necessitated. Banking reforms in India was debut its application in the early 1990s with the introduction of Electronic Fund Transfer (EFT). It has completely changed to buying habits and fashions and thereby payment modes. Demonetization in India during 2016 has been fueling individuals and businesses to use popular financial products in order to meet upcoming challenges. Fintech is one of them.eet upcoming challenges. Fintech is one of them.

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Dhaniakhali, Hooghly

Introduction

Micro, Small and Medium Enterprises (MSMEs) sector has emerged as a dynamic and vibrant sector in India. This sector contributes significantly to manufacturing output, employment and exports of our country. Thus, MSME sector is considered as backbone of Indian economy.

Despite its commendable contribution to the nations' economy, MSME sector has been suffering with massive problems. Nature and magnitude of such problems have been changing over time. One of the biggest challenges faced by this sector is lack of required financial support from banks and financial institutions coupled with high cost of credit. It is increased in manifold particularly in unbanked and under banked areas. Financial innovation or initiatives have a good role in this juncture. One of the initiatives is Fintech which is a new phenomenon in Indian financial system. It has good potentiality to resolve financial crisis of the MSMEs judiciously.

There are three broad sections in this study which is based on secondary data. In first section, study outlines of economic initiatives in Indian money market followed by discussion on various aspects of fintech and finally to examine the impact of fintech on MSME sector.

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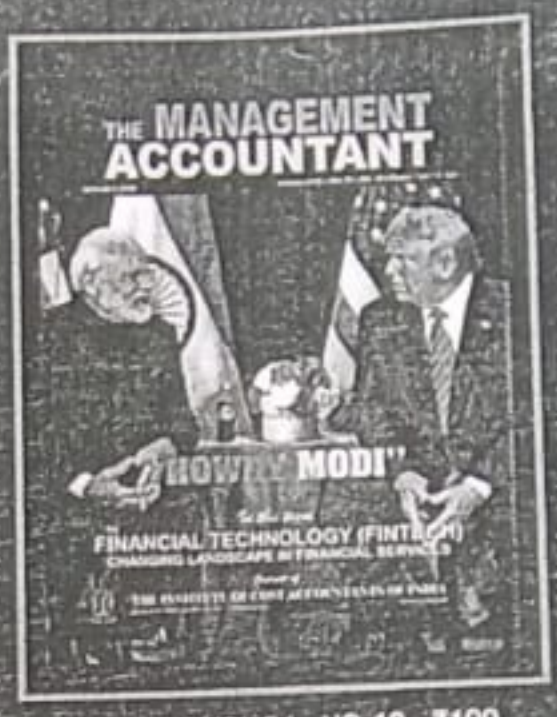

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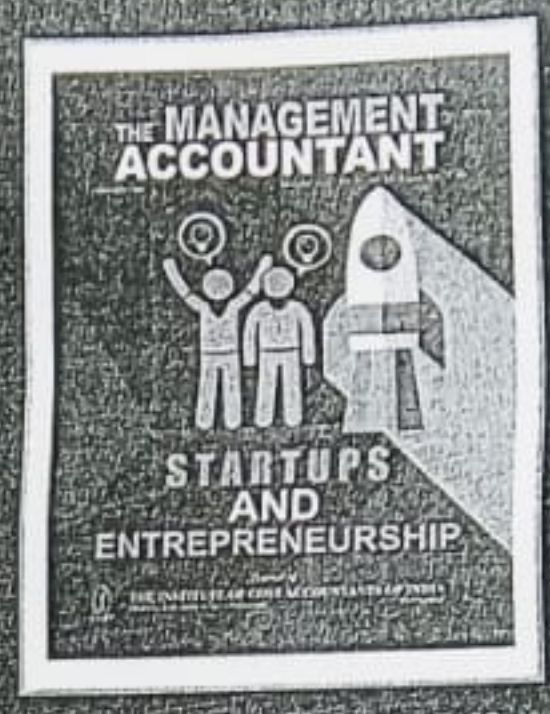

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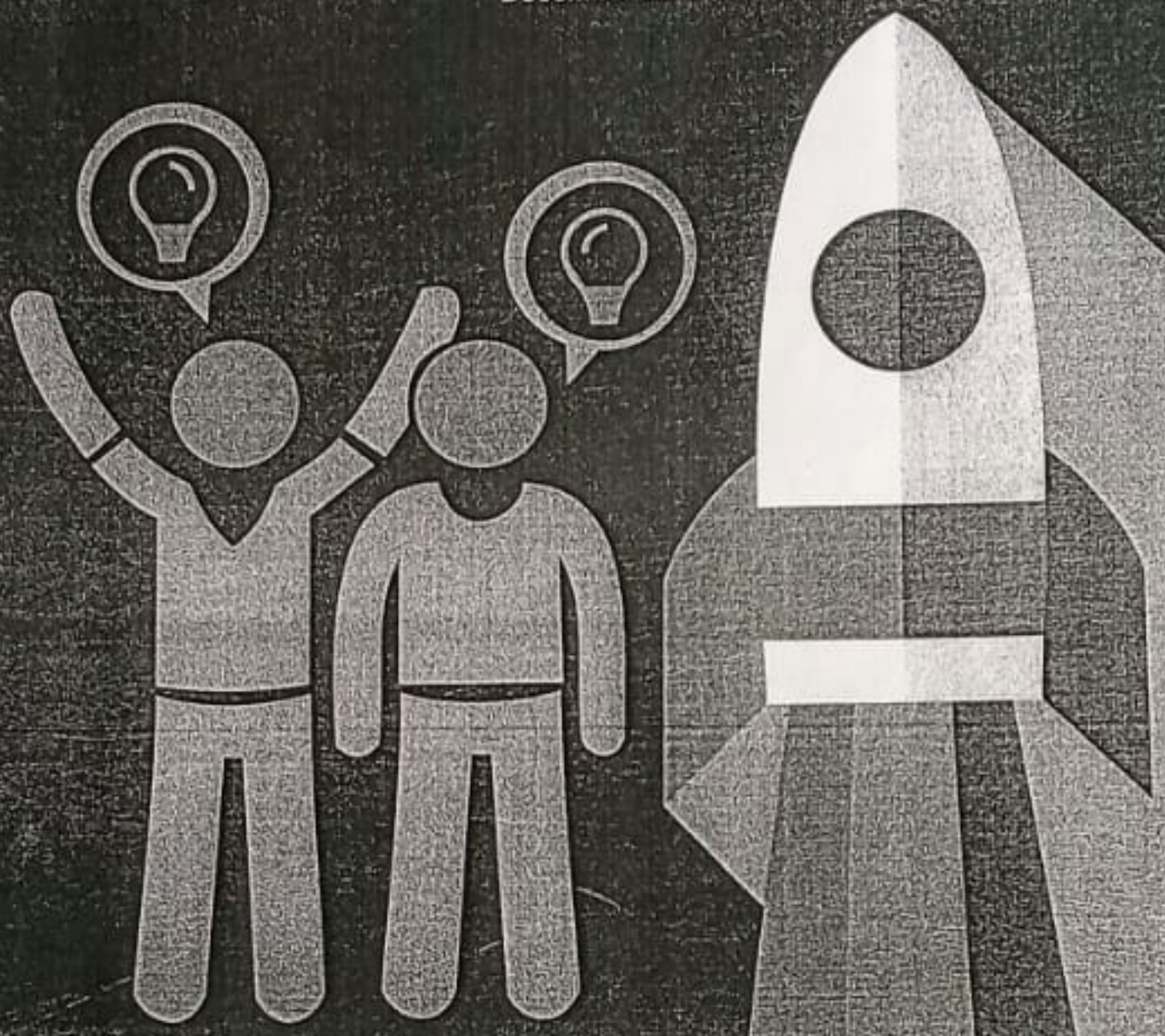

STARTUPS AND ENTREPRENEURSHIP

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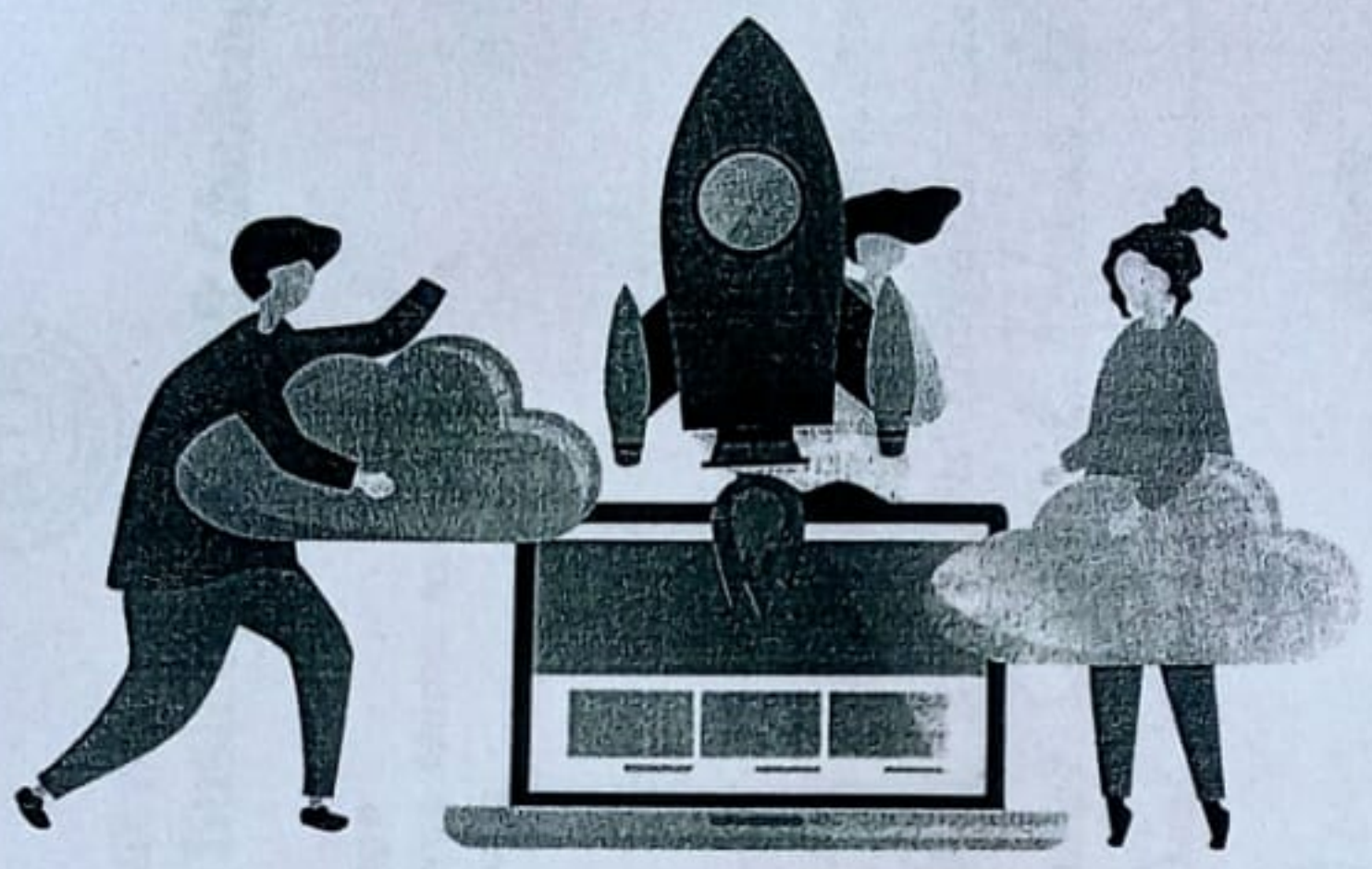

TECHNOLOGICAL STARTUP AND ITS IMPACT ON ECONOMY IN INDIA: AN OVERVIEW

Dr. Rintu Nath
HoD & Assistant Professor
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Abstract

Technology is considered as major thrust area of gaining strong economy. Indian economy has been transforming from conventional to digitalize through laughing of several initiatives. In this regard, technology startup was an important milestone in India. But, its contribution on economy has been slowly but steadily growing. Despite its contribution on economy, technology startup and its performance are not all satisfactory. The purpose of this study is to review and to evaluate technology startup and its impact on Indian economy. However, technology startup is at growing phase in India and plenty of opportunity to achieve expected goals subject to focus on innovations and initiatives.

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Articles By Raj Kumar Kundu

Water Resource Management of the Damodar Valley Corporation

Vol. 55, Issue No. 12, 21 Mar, 2020

| *Raj Kumar Kundu* *Apurba Kumar Chattopadhyay*

The water resource management of the Damodar Valley Corporation project for irrigation purposes has been examined to reveal that illegal canal water utilisation has been increasing over the years. Water availability (per hectare) has been declining in the tail-end area compared to the head-reach a middle-reach areas in all seasons.

Water Resource Management of the Damodar Valley Corporation

Tail-end Deprivation of the Canal Network

RAJ KUMAR KUNDU, APURBA KUMAR CHATTOPADHYAY

The water resource management of the Damodar Valley Corporation project for irrigation purposes has been examined to reveal that illegal canal water utilisation has been increasing over the years. Water availability (per hectare) has been declining in the tail-end area compared to the head-reach and middle-reach areas in all seasons, which has led to differentiated agricultural productivity and crop patterns across different segments of the canal command area. Further, reduction of reservoir storage capacity and increased water demand for non-agricultural purposes have reduced the share of irrigation water and increased flood hazards in the monsoon season in the downstream area of the Damodar river.

The authors thank the anonymous referee for their useful comments on the earlier draft of this paper.

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The canal irrigation potential in West Bengal was 47.6% up to 1975–76, while it has covered only 23.78% area of irrigated land till 2008–09 (Rawal 2001; Ray and Shekhar 2009). On the other hand, the groundwater irrigated area was 16% in 1982, which increased to about 56.07% during the same period (Boyce 1987; Ray and Shekhar 2009). This reveals that canals as a source of irrigation have been losing importance vis-à-vis groundwater irrigation in West Bengal. According to Mitra (1996), the reasons for the declining importance of canals as a source of irrigation lies with the problems relating to the canal irrigation management as well as those associated with their construction. Construction problems are less important compared to the operation and maintenance problems for the underutilisation or misutilisation of canal irrigation potential. In most of the canal irrigation projects, when the canal command area is ready to receive the water after completion of land-levelling and construction of field channels, the users in the head-reach area are not ready to give up their cultivation of water-intensive crops like, paddy, sugar cane, banana, etc. This leads to low and insufficient irrigation water in the tail-end area. Therefore, there is an underutilisation or misutilisation of irrigation potential and inequitable distribution of water in the head-reach and tail-end areas (Wade 1976; Gorter 1989; Dhawan 1993; Gulati et al 1994; Mitra 1996). Shah (2003) termed this phenomenon as the tail-end deprivation (TED) problem.

In this paper an attempt has been made to analyse the water resource management of the Damodar Valley Corporation (DVC) project relating to canal irrigation and its role in the deprivation of canal water in the tail-end area of the canal network by using both primary and secondary data.[1] For the primary survey, we have selected samples in the left bank main canal (LBMC) command area of DVC that originates from Durgapur barrage. It covers three districts of West Bengal, namely Burdwan, Hooghly and Howrah. The entire area has been divided into three segments, namely head-reach, middle-reach and tail-end areas.[2] The sample size in each segment is 90 with a total sample size of 270. Further, we used the plot of cultivated land as our unit of survey, and the survey was conducted from December 2012 to March 2013.

Upstream and Downstream Water Management

The upstream water management of the Durgapur barrage is carried out by the Damodar Valley Reservoir Regulation Committee (DVRRC), headed by a representative of the Central

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ARTICLES

Financial Performance of Major and Medium Irrigation Projects in India - Some Issues

Raj Kumar Kundu and Apurba Kumar Chattopadhyay*

ABSTRACT

Major and Medium (M&M) irrigation projects in India have lost its importance to ground water minor irrigation projects due to their financial problems resulting ostensibly from the highly subsidised and stagnant canal irrigation charges. This study examines financial performance of M&M irrigation projects during pre-reforms and post-reforms period and explores if higher irrigation charges may improve both irrigation efficiency and share of cost recovery. It has been found that during post-reforms period the M&M irrigation projects have faced problems of inadequate cost recovery coupled with continuous reduction of expenditure on 'maintenance and repair' which have led to reduction of irrigation efficiency. We have also found that only increasing the irrigation charges by the states may not bring about higher irrigation efficiency rather, it would be prudent on the part of the concerned state governments to wind up the revenue departments and assign the responsibility for collection of users' charges to the Gram Panchayats that will improve the financial performance of the M&M irrigation projects and also increase efficiency of the canal irrigation.

Keywords: Canal irrigation, Irrigation charges, Irrigation efficiency, Financial performance, WUAs.

JEL: Q14, Q15, Q25

I

INTRODUCTION

The state governments operate and manage the entire irrigation system of the major and medium (M&M) projects within their domestic territories in India but they often neglect the operation and maintenance (O&M) part of the projects due to paucity of funds. This is partly due to the government policies regarding the level of water rates and their recovery (Gulati *et al.*, 1994). The share of cost recovery of the O&M cost or working expenses has steadily declined, *inter alia*, due to highly subsidised canal irrigation charges and substantial time lag for the revision of water rates by some states (about 10 to 35 years till 2010).[1] It may be noted that while in 1975-76, about 96 per cent of the working expenses could be met by gross receipts (water charges and other receipts); a meager 5.8 per cent could only be met for this purpose in 1997-98. In 2013-14, this share increased to about 20 per cent (CWC, 2015). The improvement in this share in the later years reflects increased water charges by some states. It may be noted that National Water Policy statements (1978 and 2002), Vaidyanathan Committee Report (Government of India, 1992) and Tenth

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The Role of Hegemony in the Construction and Perpetuation of the Margin: Re-Reading George Orwell's *Animal Farm*

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ABSTRACT
This paper proposes to read George Orwell's novel, *Animal Farm*, to understand how Gramsci's concept of hegemony is represented in the novel and how the concept plays a crucial role in not only in constructing the marginal in a society but also in ensuring the perpetuation of their social location in the interest of the power centre of the society that instruments the application of hegemony on the margin.

KEYWORDS: Hegemony, margin, centre, class, Gramsci

Though George Orwell deals very little with the lives of the animals before the 'Rebellion' in *Animal Farm* (*AF*), it is very clear from the glimpses we get that Mr. Jones never took help of anything softer than brute force to control the animals. Clear signs of imperialism are evident in the nature of the Farm before the 'Rebellion'. The Farm was an empire of which Mr. Jones was the lord by the obvious virtue of his unanswerability. But the scenario changes as soon as Mr. Jones is ousted and the animals take upon themselves the responsibility of running the Farm. The changed scenario soon results in the turning point of the novel as Orwell himself has also said about his novel:

The turning point of the story was supposed to be when the pigs kept the milk and apples for themselves. (qtd. in Gaur 102)

This is not only a mere turning point, but also a beginning of 'a subtext of marginalization of helpless individuals by a coercive system and the unsaid misery of such souls' (Gaur 103). Before starting an analysis of that subtext, it is important to touch upon a few theoretical ideas about state and its machineries.

Antonio Gramsci, an Italian Marxist thinker, makes a contrast between 'rule' and 'hegemony'. This contrast between 'rule' and 'hegemony' is a key idea to the understanding of the subtext of *AF*. The former is, as Peter Barry says, 'direct political control, which uses force when necessary' (164). 'Hegemony', on the other hand, is very closely related to Althusser's concept of 'ideology'. It 'manufacture[s] consensus through immobile forms of social control such as the media, the educational system, religious institutions… [etc] that mould our ideas and attitudes' (Krishnaswamy 101). These 'immobile forms of social control' have been called 'Ideological State Apparatuses' by Althusser. In an imperialist state hegemony is absent almost to the point of null because the centre there has a direct control over the margin by means of force. The ruler in a democratic state cannot dominate by force and so replaces force with hegemony. So the ruler here at the centre has to fashion out the ways of 'manufacturing consensus' to keep the ruled at bay. Marx and Engels's *Communist Manifesto* (1848) announced that 'the ruling ideas of each age have ever been the ideas of its ruling class' (qtd. in Hawkes 117). According to David Hawkes, this 'dominant ideology thesis' means that the 'dominant will try to impose its own *peculiar* way of seeing the world on society as a whole' (emphasis mine, 117). The birth of hegemony is inherent in this peculiarity of the ruling class ideas: 'Thus the material basis of hegemony is constituted through reforms or compromises in which the leadership of a class is maintained' (Sassoon 230).

So the importance of hegemony for the rulers of a democratic state is very clear. Here it is not only an instrument of exploitation, but also one that is *primarily* used by the centre for the maintenance of the margin. In an imperialist state the margin submits to the centre by default but in a democratic state the centre is answerable to the margin which expects to be accommodated at the centre. Towards the end of Chapter 2 in *AF* (*Animal Farm*), the pigs milk the cows successfully and there are five buckets of milk 'at which many of the animals looked with considerable interest' (*AF* 16). This reaction, which is very unlikely in an imperialist state, shows the expectation of the margin to move towards the centre. Right at this point grows the question of the center's answerability to the margin. The dialectic between the expectancy and the answerability leads the centre to frame hegemonic ideas that undertake the task of moulding the margin's consensus. The animals in the farm are introduced to a new sort of work – brainwork – the necessity of which was never felt by Mr. Jones:

> We pigs are brainworkers […]. It is for *your* sake that we drink that milk and eat those apples. (Original emphasis, 22)

With this distinction between musclework and brainwork the pigs are claiming themselves to be 'intellectuals' who, according to Anand Prakash,

> should not be comprehended or judged by the 'internal' nature of their work […]but by the specific needs they fulfill in their social surroundings […]. [It] is essential, therefore […] to interpret their activity *in the context of their function*. (Emphasis mine, 51)

Since hegemony is a part of the superstructure of a state according to Marxist theories, Gramsci believes that

> Intellectuals are dominant group's 'deputies' serving it for holding, creating or increasing its hegemonic area. (Prakash 53)

So, after the 'Rebellion', the pigs, and especially Napoleon, have to think about 'the reproduction of the conditions of production' to put it in Althusser's words (Prakash 159). To keep the labour power existing Napoleon starts building up the 'Ideological State Apparatuses' first and then slowly the 'Repressive State Apparatuses'. He employs Sqealer as his mouthpiece who very tactfully explains the activities of the centre to the margin and terms them as 'tactics' to his comrades (37). He even goes to the extent of hegemonising the existence of Mr. Jones:

> Do you know what would happen if we pigs failed in our duty? Jones would come back! Yes, Jones would come back! […] Surely there is none among you who wants to see Jones coming back? (22)

After the expulsion of Snowball he also utilizes the absence of Snowball in the same way as Mr. Jones's, and gradually 'Whenever anything went wrong it became usual to attribute it to Snowball' (48). Since history is a very important element in forming ideologies, Napoleon starts tampering history and Squealer brings down Snowball from 'Animal Hero, First Class' to the level of a traitor and spy:

> Snowball was in league with Jones from the very start! […] It has been proved by document […] which we have just discovered. (49)

Slowly, the whole issue of Snowball becomes so puzzling for the animals that he becomes a personified hegemony for them as Orwell describes:

> It seemed to them as though Snowball were some kind of invisible influence, pervading the air about them and menacing them with all kinds of dangers. (49)

To ensure the distance between the margin and the centre, Squealer also hegemonies the concept of centre itself:

> Do not imagine, comrade, that leadership is a pleasure! On the contrary, it is a deep and heavy responsibility. (35)

Napoleon strategically takes away the voice of the margin when right after the expulsion of Snowball 'he announced that from now on the Sunday morning meetings would come to an end'

(34). This is only to ensure the gap between the margin and the centre which the latter always need to secure their position. They are even moulding their duty of answerability to suit their purposes and, for this, terminate the Sunday morning meetings which were a ground for open debate. But the point to be noted is that Napoleon does not abolish the rituals of saluting the flag and singing 'Beast of England' on Sunday mornings. This is one of the crudest examples of hegemony being used for maintaining the existence of the margin when we see that the rulers are purposefully utilizing even patriotic feelings to serve their ends.

The role of religion as one of the apparatuses is very interesting. In chapter 2, Moses, the raven, was disliked for propagating 'Sugarcandy Mountain', a heaven for animals against which 'the pig had to argue very hard to persuade [the animals] that there was no such place' (10). But after the 'Rebellion' is long past 'when it seem[s] to the animals that they [work] longer hours and [are] fed no better than they had in Jones's day (56), they start believing that it is 'right and just that a better world should exist somewhere else' (72). Moses is back once again with his heavenly stories and, strikingly enough, the pigs '[allow] him to remain on the farm, not working, with an allowance of a gill of beer a day' (73). It clearly shows that Napoleon is intelligent enough to see that the margin cannot be fed on data only

> […] they had more oats, more hay, more turnips than they had in Jones's day […] that they had more straw in their stalls and suffered less from fleas. (69)

These entire 'tactics' yield the centre the desired result when, from a safe distance *for* the centre, the margin starts believing:

> But if there were hardships to be borne, they were partly offset by the fact that life nowadays had a greater dignity than it had before. There were more songs, more speeches, more processions […] they were able to forget that their bellies were empty, at least part of the time. (71-2)

The educational system, though generally considered to be an element of the ideological state apparatuses, plays a complex role in this novel. Napoleon uses it to build up the repressive state apparatus when he takes away for education the nine little puppies from their mothers and 'took them up into a left […] and there kept them in such seclusion that the rest of the farm soon forgot their existence (21). Here education alienates them from the margin and apparently accommodates them into the centre, as they become the sword bearers of the state. No doubts that, as a result of this, they enjoy a privilege of having the same kind of food and habitation like the pigs in addition to an awful reverence from the margin which seemingly make them, feel a part of the centre. But when towards the end of the novel one of the most loyal members of the margin, Boxer, is sent to the knackers in the guise of sending him to a hospital, we can easily predict the fate of these dogs, which waits them, when they grow old and useless to the centre as Boxer. One shivers remembering old Major's speech:

> As for the dogs when they grow old and toothless, Jones (read Napoleon) ties a brick round their necks and drowns them in the nearest pond. (5)

But when the question is about educating the young pigs, it cannot be nay hanging school in a secluded loft. 'It [is] announced that […] a schoolroom would be built in the farmhouse garden' (70).

Slowly the ideas of the ruling class become the ruling ideas of the state. Exploitation becomes then a spontaneous by product of Boxer's newfound motto: 'Napoleon is always right' (35). The centre also rests assured about the loyalty of the margin to this motto. The urgencies of maintenance fade out and the centre then once more swiftly shifts the baton of running the state from 'hegemony' to 'rule'. As long as the rulers are concerned about margin's expectations to reach the centre they must take the pain of painting 'a hoof and a horn in white' on ' an old green tablecloth of Mrs. Jones's'(18). But as soon as this maintenance cripples the margin to stagnancy, the thriving centre gives out the ruling that 'It would be a plain green flag from now onwards' (87).

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PRIMARY RESEARCH PAPER

Effects of nutrient limitation, salinity increase, and associated stressors on mangrove forest cover, structure, and zonation across Indian Sundarbans

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Abstract Anthropogenic coastal activities and natural stressors aggravate degradation of small coastal patches of mangroves, which in turn destroy local resilience of mangrove forests in the Indian Sundarbans, the continuous mangrove habitat that spans between India and Bangladesh. We conducted an analytical survey across 19 shoreline mangrove fringes spanning the Sundarbans, including both healthy and disturbed forests, and evaluated ninety-five 60-cm composite sediment cores across a degradation and salinity gradient from ~ 4 to ~ 12 ppt. Increased salinity and anoxicity greatly inhibited nutrient cycling and release by microbial decomposers, subsequently resulting in nutrient-poor soil as a condition of degradation. Nutrient limitation, salinity rise, anoxicity increase, and sulfide build-up negatively controlled forest structure causing declines of forest coverage from ~ 98 to ~ 11%. In addition, the tide-dominated salinity gradient controlling species zonation was disrupted in disturbed forests with salinity-sensitive species gradually disappearing. An obvious change in species distribution is anticipated while salt-sensitive *Heritiera fomes*, *Xylocarpus* spp., and *Phoenix paludosa* failed to cope with increased salinity, evident by their absence from many forests. *Excoecaria agallocha* and *Avicennia* spp. acclimated well and expanded freely into degraded forests across the Sundarbans. Overall, our study strongly

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Rajojit Chowdhury and Tapan Sutradhar have contributed equally to this work.

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SCIENTIFIC REPORTS
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OPEN

Forecasting mangrove ecosystem degradation utilizing quantifiable eco-physiological resilience -A study from Indian Sundarbans

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Sundarbans mangrove forest, the world's largest continuous mangrove forests expanding across India and Bangladesh, in recent times, is immensely threatened by degradation stress due to natural stressors and anthropogenic disturbances. The degradation across the 19 mangrove forests in Indian Sundarbans was evaluated by eight environmental criteria typical to mangrove ecosystem. In an attempt to find competent predictors for mangrove ecosystem degradation, key eco-physiological resilience trait complex specific for mangroves from 4922 individuals for physiological analyses with gene expression and 603 individuals for leaf tissue distributions from 16 mangroves and 15 associate species was assessed along the degradation gradient. The degradation data was apparently categorized into four and CDFA discriminates 97% of the eco-physiological resilience data into corresponding four groups. Predictive Bayesian regression models and mixed effects models indicate osmolyte accumulation and thickness of water storage tissue as primary predictors of each of the degradation criteria that appraise the degradation status of mangrove ecosystem. RDA analyses well represented response variables of degradation explained by explanatory resilience variables. We hypothesize that with the help of our predictive models the policy makers could trace even the cryptic process of mangrove degradation and save the respective forests in time by proposing appropriate action plans.

The Sundarbans stretches along the coast of Bangladesh and India and forms the largest contiguous mangrove forest in the world.The Indian part of Sundarbans received its formal designation recently in 2019 as Ramsar site (https://rsis.ramsar.org/ris/2370) and the Government of Bangladesh had already designated their part of the mangrove forests as Ramsar in 1992 (https://rsis.ramsar.org/ris/560) thus bringing the entire mangrove swamp under the domain of Ramsar wise use framework. UNESCO announced the Sundarbans a World Heritage Site in 1997[1]. In India, the stretch of Sundarbans is extended in southern part of the state of West Bengal along the estuarine coastline. It is the abode of highly diverse true mangrove species and some typical back mangroves referred as mangrove associates that do not possess the true mangrove characters but have the adequate potential to adapt to the mangrove environment. A heterogeneous assemblage of representatives from divergent and unrelated families migrating from mesophytic environment towards this estuarine extremophilic ecosystem and climaxing in a convergent evolution bring in uniqueness in this mangrove niche.Mangroves are among coastal foundation species that structure the coastal floral and faunal communities by modifying their habitats leaving a major influence on surrounding ecosystem structure and function[2]. Hence mangrove degradation is thought to impact the coastal ecosystem greatly. At the present moment small mangrove patches in Indian Sundarbans are facing immense threats of degradation[3]. This rapid degradation is caused due to increase in anthropogenic interferences such as conversion for urbanization, pisciculture, agriculture, salt farming, tourism, mining, refineries, dam and road constructions; changes in hydrological regimes; coastal pollution; siltation; exploitation of fishery resources; cattle grazing; incessant deforestation[4]. Natural stressors like increase in sediment salinity, increasing

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ORIGINAL ARTICLE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in nonideal classical plasmas

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Abstract

Effects of nonideality of classical plasma on the reaction: $p + H(1s) \rightarrow H(nlm) + p$ has been investigated by carrying out fully quantum mechanical calculations within the framework of a first-order distorted wave method. Scattering amplitude is calculated conveniently by employing a simple, variationally determined wave function of hydrogen atom embedded in nonideal classical plasma. A detailed study is made on the changes in electron transfer cross sections due to the nonideality of plasma varying from 0 to 4 and the incident proton energy lying between 10 and 500 keV. It has been found that nonideality of plasma causes substantial change in capture cross section.

KEYWORDS

charge transfer, distorted wave method, non-ideal plasma, proton-hydrogen collision, pseudopotential

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a paradigm of charge (electron) transfer during collisions. Studies on such scattering process provide us with several important information regarding mechanism of charge transfer processes. Moreover, the scattering of proton from hydrogen atom takes place naturally in various astrophysical environments.[1–9] As a result, various properties of the embedding environment are characterized by such scattering. Data of various scattering cross sections (CSs) are of frequent use in plasma diagnostics and interpretation of various astrophysical phenomena.[8,9] For instance, scattering CSs are used to calculate the profiles and intensities of emission (absorption) lines produced by hydrogen atom.[9] This scattering model has also an impact on fusion research.[10]

Over past few decades, the scattering of proton from hydrogen atom has been investigated quite elaborately[10–34] (and further references therein) by applying various techniques. Particular emphasis was given to obtain cross sectional data quite accurately for low to lower incident proton energies. In most of the reported studies, investigations were made in vacuum, that is interactions among protons and electron were considered to be pure Coulombic in nature.

In this work, we make an attempt to study the scattering process,

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in nonideal classical plasmas (NCP). Nonideality of plasma is characterized by the nonideality parameter γ which is defined as the ratio of mean potential energy to the mean kinetic energy of the thermal motion of the plasma particles.

Winter 2-8-2021

Contribution of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through OpenDOAR as on: 01.10.2020

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Contribution of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through OpenDOAR as on: 01.10.2020

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ABSTRACT

This paper study open access repositories in the contribution of BIMSTEC country through OpenDOAR to demonstrate country wise no of repositories, ccategory wise, language wise, software wise, subject wise, software wise, content wise distribution of these repositories. These BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country which is include Bhutan, India, Myanmar, Sri Lanka, Thailand, Bangladesh, Nepal. This paper includes only one conceptual part – i) analysis of these countries through OpenDOAR set a parameter like software in use, country of origin, language wise distribution, document types etc.; and ii) growth of these countries using these OpenDOAR. Here, OAI/PMH compliant are not using OA repositories system. At present it shows country wise distribution, language wise distribution, software wise distribution, subject wise distribution etc. perspective study for this system. It will be helpful throughout the all over world to spreading free access knowledge.

Keywords: OA Archives, Green Open Access, OpenDOAR, Open Access Repositories, Institutional Repositories

Introduction: BASE -an exclusive search engine for Open Access (OA) scholarly materials recently reports coverage of 82 million OA resources (as on March 31, 2015), DOAJ now covers 10,500+ OA journals, OpenDOAR and ROAR provides listing of more that 3,500+ OA repositories (as on March 31, 2015). These facts and figures indicate that a movement, the growth of OA repositories helps users to find out OA version of journal papers that are otherwise available through commercial channels. But at the same time the exponential growth of OA in distributed manner creates problems in OA retrieval (Sarkar & Mukhopadhyay, 2010).

Open DOAR is an authoritative directory of academic open access repositories. Each Open DOAR repository is visited by project staff to check the information that is provided by the repositories. This in-depth approach does not work-on automated analysis and gives a controlled list of repositories after human evaluation (Wikipedia, 2015).

OpenDOAR provides simple repository list, search for repository or search repository contents. The content search interface of OpenDOAR is supported Google Custom Search Engine (CSE) and thereby ensures the power search features of the search leader of the world. The search repository provides tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure. Institutional repositories are one of the recommended ways to achieve the open access vision

described in the Budapest Open Access Initiative definition of open access. This is sometimes referred to as the self-archiving or 'green' route to open access (Wikipedia, 2017). Presently, it covers around 3200+ OA repositories with detail information on each of the listed repositories.

This paper is an attempt to analyze current status of OA repositories on BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR propose a model for integration of all OAI/PMH compliant repositories in the domain for end users. BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country are included these countries.

1.Bangladesh
2.Bhutan
3.India
4.Myanmar
5.Nepal
6.Sri Lanka
7.Thailand

Objectives:

In this era, Open DOAR repositories are spreading knowledge day-by-day all over world. As on date OpenDOAR analysis BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country (data as on October 1st, 2020 reported in OpenDOAR). But OpenDOAR is not the only tool in the domain. There are two major tools to identify OA repositories which are OpenDOAR (Directory of Open Access Repositories), ROAR (Registry of Open Access Repository) etc. There are overlaps in these directory services but as OpenDOAR is more comprehensive, this article depends on the datasets as given in OpenDOAR. Analysis all perspective of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country.

The objectives of this study are to diagnose:

- To develop a state-of-the-art report/dataset on open access (particularly Green path) in the particular domain of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country.
- To study OA repositories on BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through explain different generic parameters.

1. These are, country wise distribution,
2. Category wise distribution,
3. Language wise distribution,
4. Software wise distribution,
5. Subject wise distribution,
6. Content wise distribution
7. Growth of OpenDOAR (BIMSTEC country) etc and so on.

Discussion and analysis all criteria of BIMSTEC country (as on: 01.10.2020):

No. of Repositories

It is interesting to note that the total no of repositories 150 (100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories', and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Table 1: No of Open Access Repositories: Country wise distribution

Sl.No	Country	No of Repositories	Percentage
1	**Bangladesh**	14	9.33
2	**Bhutan**	0	0
3	**India**	100	66.66
4	**Myanmar**	2	1.33
5	**Nepal**	1	0.66
6	**Sri Lanka**	16	10.66
7	**Thailand**	17	11.33
	Total	150	100

Table 1: Country wise distribution through OpenDOAR

Table 1 is based on the number of repositories are distributed country wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Country wise distribution showing in bar chart which is given below:

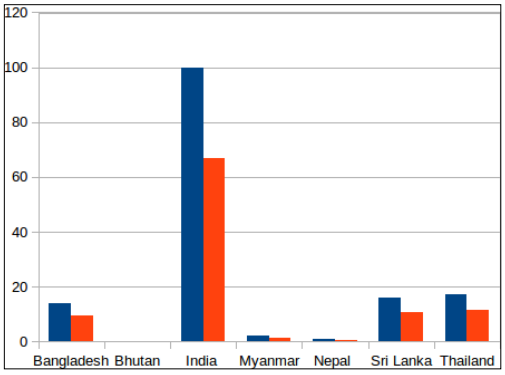


Fig. 1: Distribution of LIS OA Journals by country wise showing in column diagram.

Table 2: Open Access Repositories: Category wise ddistribution

It is interesting to note that the total no of repositories 145(100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories', and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Sl.No	Country	Institutional	Disciplinary	Governmental	Aggregating	Total
1	Bangladesh	13	1	1	0	15
2	Bhutan	0	0	0	0	0
3	India	81	10	1	5	97
4	Myanmar	2	0	1	0	2
5	Nepal	0	1	0	0	1
6	Sri Lanka	16	0	0	0	16
7	Thailand	12	1	1	0	14
	Total Repository	124	13	4	5	145
	Percentage	85.51	8.96	2.75	3.44	100

Table 2: Category wise distribution through OpenDOAR

Table 2 is based on the number of repositories are distributed country wise of OA compatible repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Country wise distribution showing in bar chart which is given below:

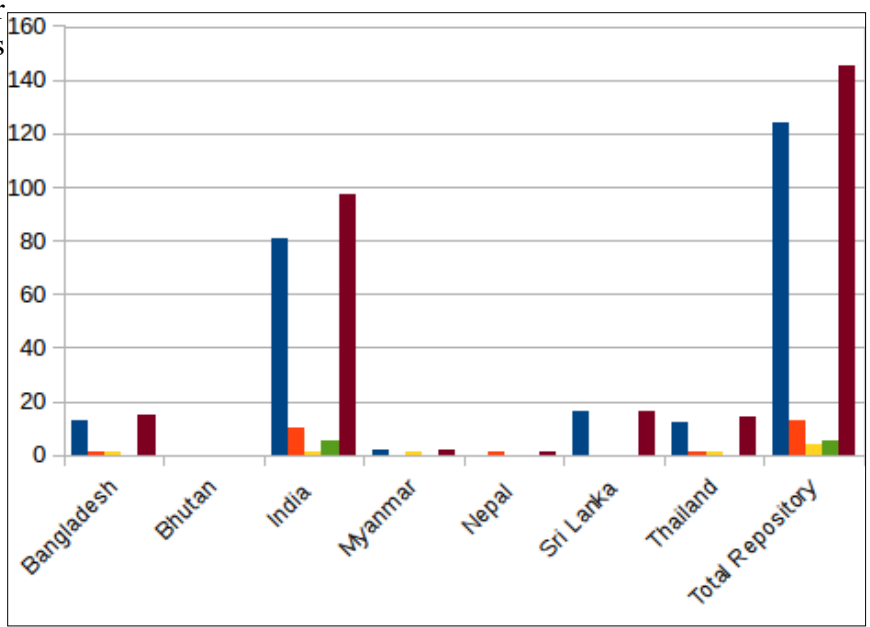


Fig. 2: Distribution of LIS OA Journals by country wise showing in column diagram.

Table 3: Open Access Repositories: Language wise distribution

As expected, the total no of repositories is 180(100%). In these repositories total English language are used 134 in BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. But in India 92 English language are used. It is highest rate of language all over world. After that, the second position of Thai language is total 14. Total Hindi Language are used 9 and it is only used in India. And the lowest number of languages is Arabic, Persian (Farsi), Sanskrit, Kannada language.

Sl.No	Country	English	Hindi	Bengali	Marathi	Malayalam	Gujrati	Arabic	Persian(Farsi)	Sanskrit	Kannada	Tamil	Thai	Sinhalese	Total
1	**Bangladesh**	14	0	3	0	0	0	0	0	0	0	0	0	0	17
2	**Bhutan**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	**India**	92	9	1	2	2	3	1	1	1	1	0	0	0	113
4	**Myanmar**	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5	**Nepal**	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6	**Sri Lanka**	14	0	0	0	0	0	1	0	0	0	2	0	5	22
7	**Thailand**	11	0	0	0	0	0	0	0	0	0	0	14	0	25
	Total Repository	134	9	4	2	2	3	1	1	1	1	2	14	5	180
	Percentage	74.44	5	2.22	1.11	1.11	1.66	0.55	0.55	0.55	0.55	1.11	7.77	2.77	100

Table 3: No of Language wise distribution of OAI compatible repositories (Green path)

Table 4 is based on the number of repositories are distributed in language wise of OAI compatible repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Language wise distribution showing in bar chart which is given below:

Fig. 3 : Distribution of LIS OA repositories by Language wise showing in bar diagram

Table 4: Open Access Repositories: Software wise Distribution

As reported earlier discussion, DSpace is the most popular open-source software. In BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories DSpace software is used 93 (69.92%). In India 34 Dspace software are used in different repositories all over India. But in India EPrints used 41 repositories. This is largest number of repositories, EPrints is used in repositories which is (30.82%). After that, Greenstone 5(3.75%), Drupal 1(0.75%), Others 8(6.01%) software are used in repositories.

No. of Country		**Name of Software**					
		DSpace	**Eprints**	**Greenstone**	**Drupal**	**Others**	**Total**
	Bangladesh	13	0	2	0	0	15
	Bhutan	0	0	0	0	0	0
	India	34	41	1	1	5	82
	Myanmar	2	0	0	0	1	3
	Nepal	0	0	0	0	0	0

	Sri Lanka	15	0	0	0	1	16
	Thailand	16	0	0	0	1	17
	Total Software	93	41	5	1	8	133
	Percentage	69.92	30.82	3.75	0.75	6.01	100

Table 4 : No of Software wise distribution of OAI compatible repositories(Green path)

Table 4 is based on the number of repositories are distributed in Software wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Software name wise distribution showing in bar chart which is given below:

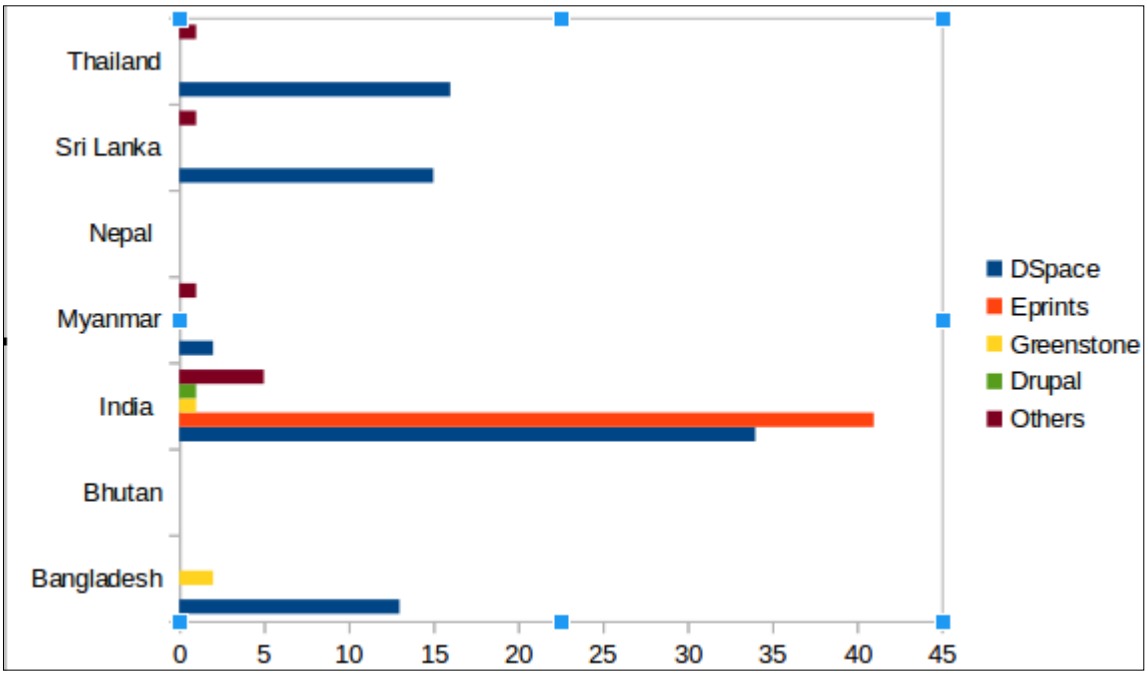


Fig. 4: Distribution of LIS OA repositories by Software wise showing in bar chart

Table 5: Open Access Repositories: Subject wise distribution

It is interesting to note that the total no of repositories 145(100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories, and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Subjects	Nepal	Thailand	India	Sri Lanka	Bangladesh	Bhutan	Myanmar	Total
Agriculture, Food and Veterinary	1	2	9	4	2	0	0	18
Multidisciplinary	1	10	41	8	10	0	2	72
Business & Economic	0	0	2	1	3	0	0	6
Computer & IT	0	0	6	1	1	0	0	8
Arts & Humanities General	0	0	2	2	1	0	0	5
Language & Literature	0	0	1	0	1	0	0	2
Library and Information Science	0	0	6	0	2	0	0	8
Technology General	0	0	11	0	0	0	0	11
Architecture	0	0	1	0	0	0	0	1
Electrical & Electronic Engg	0	0	5	0	2	0	0	7
Social Science General	0	1	3	0	0	0	0	3
Eduction	1	1	1	0	0	0	1	4
Law & Politics	1	0	1	0	2	0	0	4
Management & Planning	0	0	2	0	2	0	0	4
Mechanical Engg & Materials	0	0	3	0	1	0	0	4
Ecology & Environment	0	1	5	2	0	0	0	8
Earth & Planetary Science	0	0	3	0	0	0	0	3
Civil Engg	0	0	5	0	1	0	0	6
Psychology	0	0	1	0	0	0	0	1
Geography & regional Studies	0	0	0	0	0	0	0	0
History & Archeology	0	0	0	1	1	0	0	2
Philosophy & Region	1	1	0	1	0	0	0	3
Biology & Bio-Chemesrty	0	0	9	0	1	0	0	10
Math & Statistics	0	0	4	0	0	0	0	4

Chemistry & Chemical Technology	0	0	11	0	0	0	0	11
Physics & Astronomy	0	0	7	0	0	0	0	7
Mechanical Engg & Materials	0	0	3	0	0	0	0	3
Health & Medicine	**0**	2	11	0	2	0	0	13
Science General	0	0	9	1	0	0	0	10
Total Subject	5	18	162	21	32	0	3	241
Percentage	2.07	7.46	67.21	8.71	13.27	0	1.24	100

Table 5: Subject wise distribution in Open Access repositories

Table 5 is based on the number of repositories are distributed in Software wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Software name wise distribution showing in bar chart which is given below:

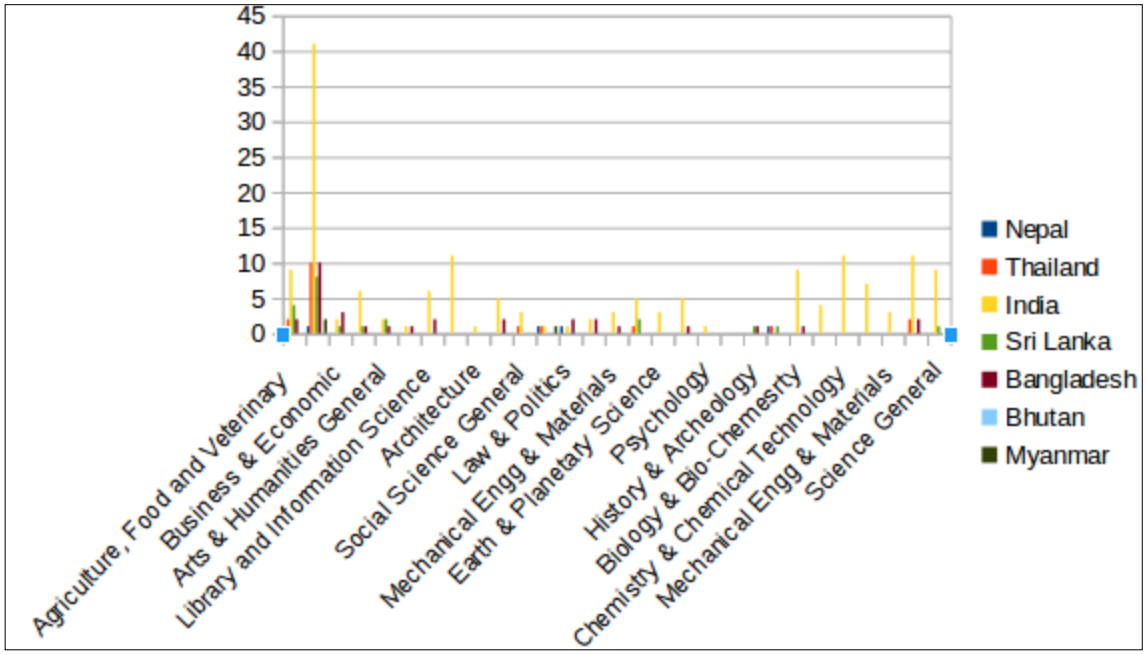


Fig. 7 : Distribution of LIS OA repositories by Software wise showing in column chart

Table 6: Open Access Repositories: Content wise distribution

It is interesting to note that the total no of repositories 465(100%) in BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Bangladesh contains 47(10.10%) repositories. Bhutan lies 0 repositories, and the

percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Subject	**Nepal**	**Thailand**	**India**	**Sri Lanka**	**Banglades h**	**Bhutan**	**Myanmar**	**Total**
Books and Chapters and Sections	0	8	35	11	4	0	0	58
Journal Articles	0	13	70	13	10	0	3	109
Dataset	0	0	3	0	0	0	0	3
Learning Objects	0	3	19	2	2	0	0	26
Multimedia	0	0	0	0	0	0	0	0
Patents	0	0	6	0	0	0	0	6
Special	0	0	0	0	0	0	0	0
Theses and Dissertation	0	9	52	8	10	0	2	81
Unpublished	0	0	0	0	0	0	0	0
Bibliographic References	0	4	14	3	1	0	0	22
Reports and Working Papers	0	9	28	5	9	0	0	51
Other Special item types	1	8	31	0	6	0	0	45
Conference and Workshop Papers	0	9	47	7	5	0	0	68
Total Subject Repository	1	63	305	49	47	0	5	465
Percentage	0.21	13.54	65.59	10.53	10.10	0	1.07	100

Table 5: Subject wise distribution in Open Access repositories

Table 5 is based on the number of repositories are distributed in Software name wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Content wise distribution showing in column chart which is given below:

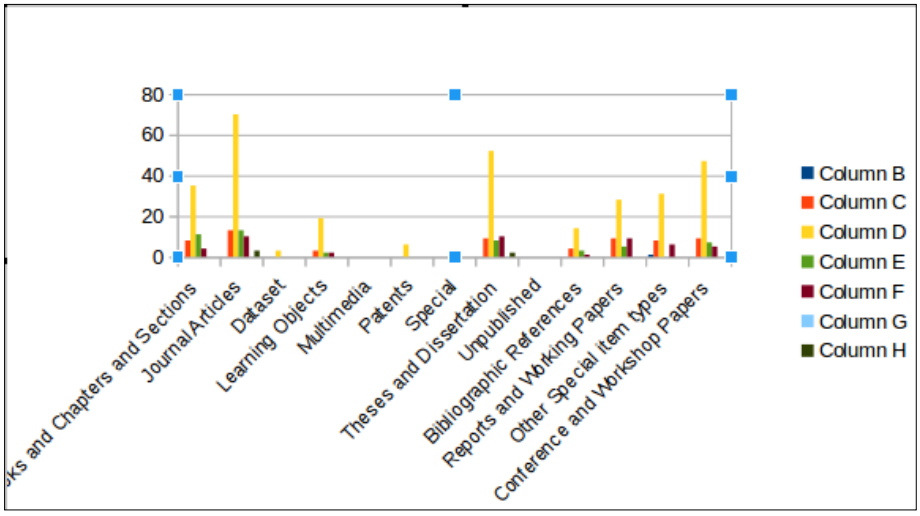
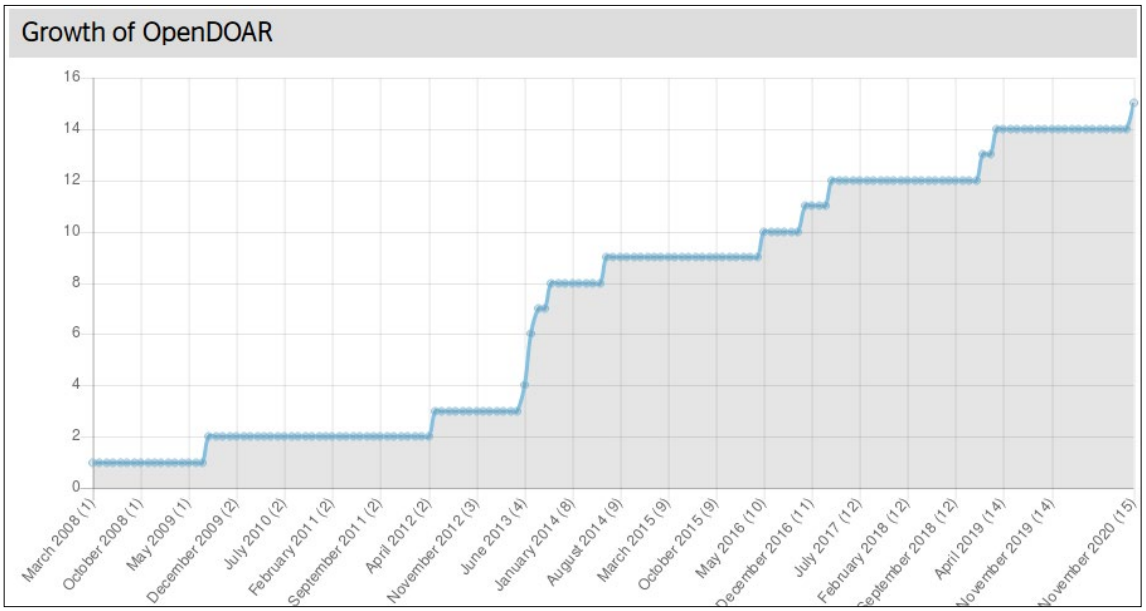


Fig. 5 : Distribution of LIS OA repositories by Software wise showing in coloum chart

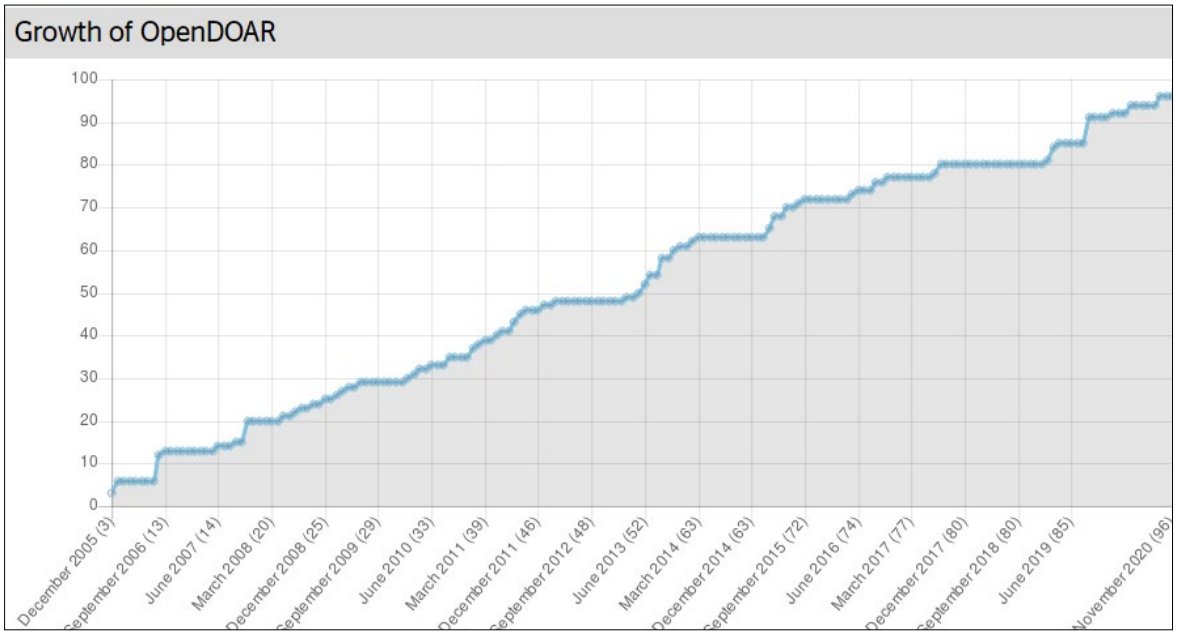
Table 7: Growth of OpenDOAR

Bangladesh showing growth of OpenDOAR.



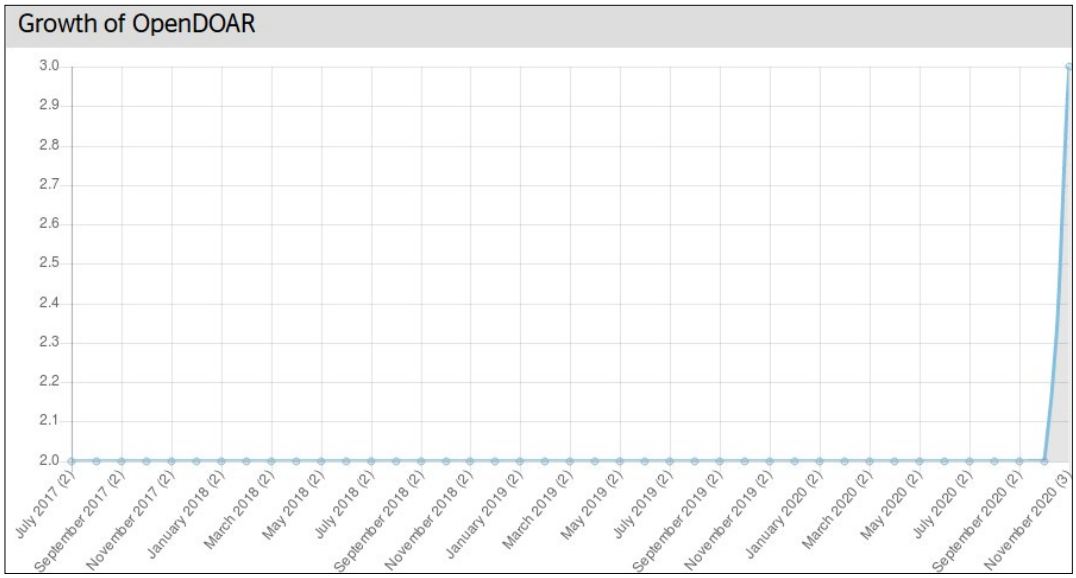
In 2008 Bangladesh contain 1 repository and after long time the growth of OpenDOAR repositories is now 15, as on 01.10.2020.

India showing growth of OpenDOAR.



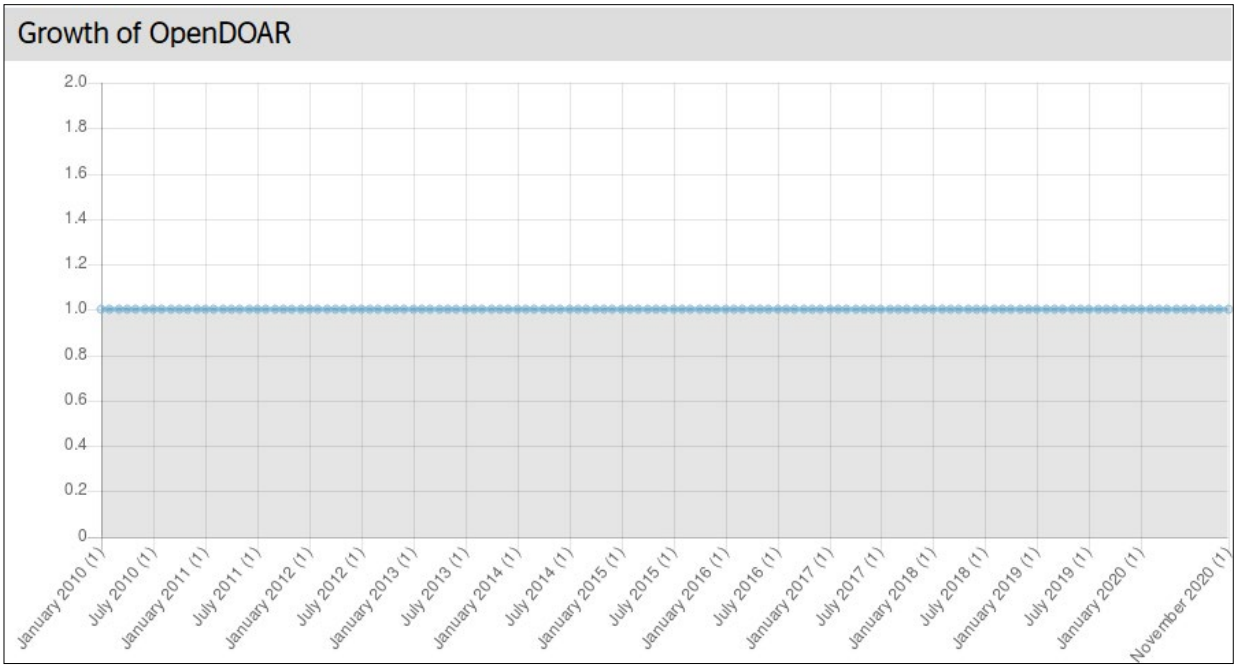
In 2005 India contain 3 repositories and after long time the growth of OpenDOAR repositories is now 100, as on 01.10.2020. That is highest repository continent in the BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories

Myanmar showing growth of OpenDOAR



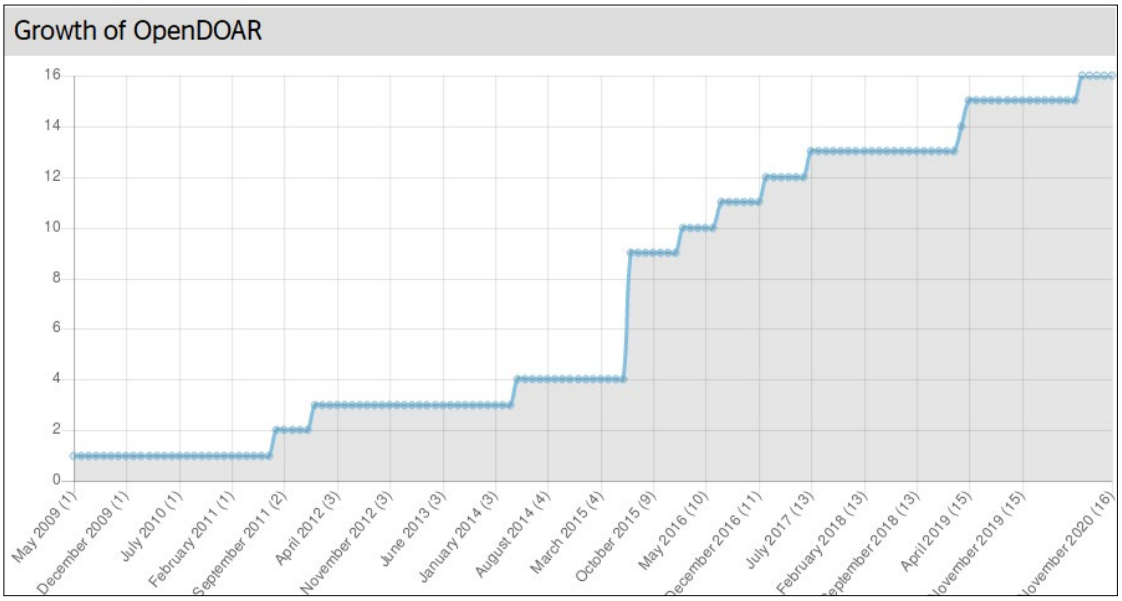
In 2017 Myanmar contain 2 repositories and after long time the growth of OpenDOAR repositories is now 3 in, as on 01.10.2020.

Nepal showing growth of OpenDOAR.



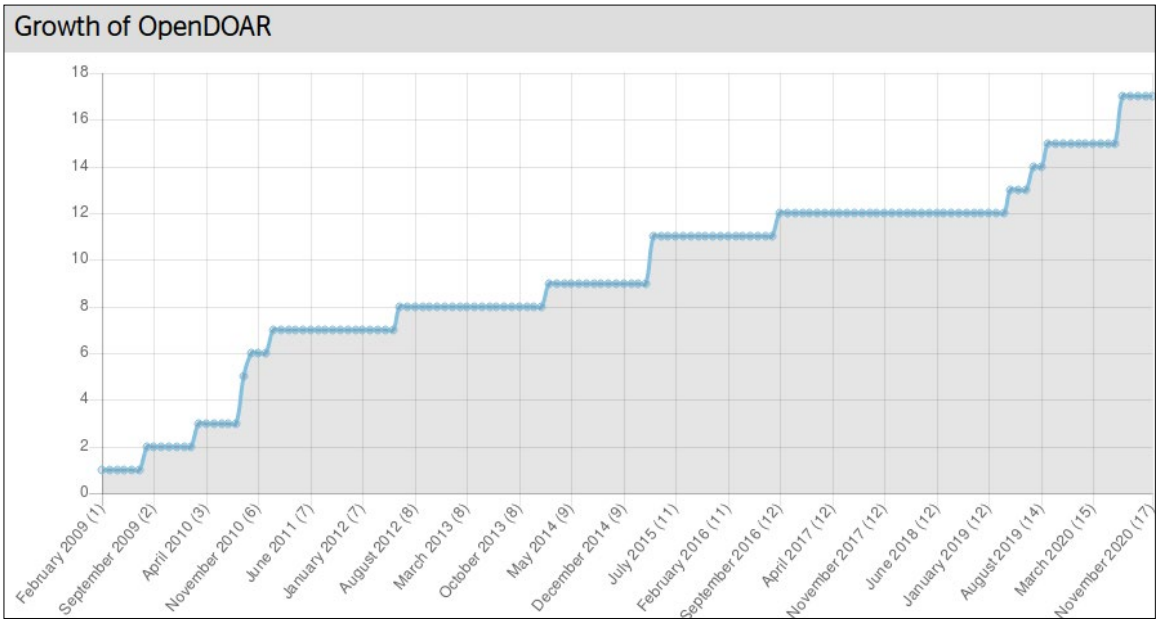
In 2010 Bhutan contain 1 repository and after long time the growth of OpenDOAR repositories is now 1 in, as on 01.10.2020. The number of repositories is not changeable.

Sri Lanka showing growth of OpenDOAR.



In 2009 Sri Lanka contain 1 repository and after long time the growth of OpenDOAR repositories is now 16, as on 01.10.2020.

Thailand showing growth of OpenDOAR



In 2009 Thailand contain 1 repository and after long time the growth of OpenDOAR repositories is now 17, as on 01.10.2020. The huge growth rate is shown in this country.

Conclusion: Currently, Open Access is playing a big function to pave the path of an alternative scholarly communication system in place of or in addition to the traditional value based scholarly communication process. In BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country, India has largest no of repositories through Open DOAR. Total number of repositories is 100 in India. In Bhutan there is no repositories till date. The Green Open Access repositories are used research in public domain freely and instantly is becoming a reality day-by-day. This paper demonstrates the possibility in contain of BIMSTEC countries. It shows the global trend of opening research results speedily. Category wise institutional repositories are high in number and governmental repositories are low in number. Most of the English language are used in repositories. DSpace software are used in most of the repositories. Subject wise multidisciplinary content are used in repositories. Content wise journal article are used in these repositories. Bhutan has no any other repositories to spread high quality of knowledge.

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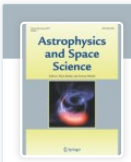

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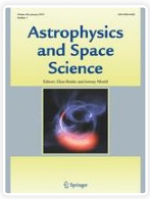

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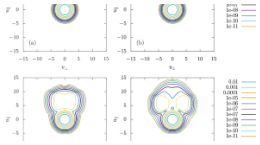

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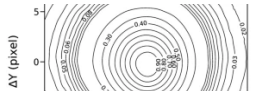

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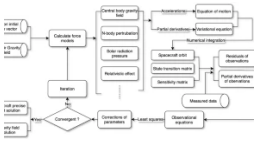

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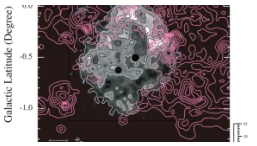

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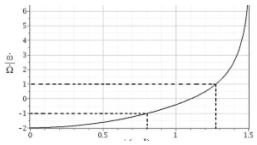

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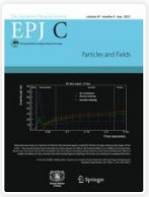

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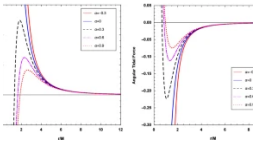

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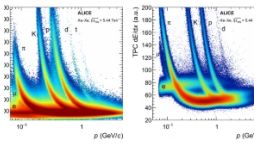

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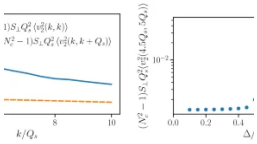

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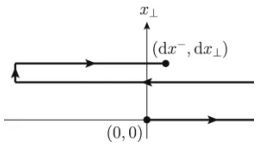

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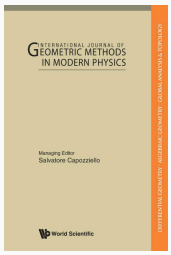

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DOI: 10.1002/ctpp.202000080

ORIGINAL ARTICLE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in nonideal classical plasmas

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Abstract

Effects of nonideality of classical plasma on the reaction: $p + H(1s) \rightarrow H(nlm) + p$ has been investigated by carrying out fully quantum mechanical calculations within the framework of a first-order distorted wave method. Scattering amplitude is calculated conveniently by employing a simple, variationally determined wave function of hydrogen atom embedded in nonideal classical plasma. A detailed study is made on the changes in electron transfer cross sections due to the nonideality of plasma varying from 0 to 4 and the incident proton energy lying between 10 and 500 keV. It has been found that nonideality of plasma causes substantial change in capture cross section.

KEYWORDS

charge transfer, distorted wave method, non-ideal plasma, proton-hydrogen collision, pseudopotential

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a paradigm of charge (electron) transfer during collisions. Studies on such scattering process provide us with several important information regarding mechanism of charge transfer processes. Moreover, the scattering of proton from hydrogen atom takes place naturally in various astrophysical environments.[1–9] As a result, various properties of the embedding environment are characterized by such scattering. Data of various scattering cross sections (CSs) are of frequent use in plasma diagnostics and interpretation of various astrophysical phenomena.[8,9] For instance, scattering CSs are used to calculate the profiles and intensities of emission (absorption) lines produced by hydrogen atom.[9] This scattering model has also an impact on fusion research.[10]

Over past few decades, the scattering of proton from hydrogen atom has been investigated quite elaborately[10–34] (and further references therein) by applying various techniques. Particular emphasis was given to obtain cross sectional data quite accurately for low to lower incident proton energies. In most of the reported studies, investigations were made in vacuum, that is interactions among protons and electron were considered to be pure Coulombic in nature.

In this work, we make an attempt to study the scattering process,

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in nonideal classical plasmas (NCP). Nonideality of plasma is characterized by the nonideality parameter γ which is defined as the ratio of mean potential energy to the mean kinetic energy of the thermal motion of the plasma particles.

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EDITOR'S CHOICE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in dense semi-classical hydrogen plasma

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Abstract

Quantum mechanical calculations have been accomplished to study the dynamics of the reaction: $p + H(1s) \rightarrow H(nlm) + p$ in dense semi-classical hydrogen plasma. Interactions among the charged particles in plasma are represented by a pseudopotential which takes care of the collective effects at large distances and quantum effect of diffraction at small distances. Various capture cross sections are computed for the incident proton energy lying within 10 to 500 keV by applying a distorted wave method which uses a variationally determined closed-form wave function of hydrogen atom. Moreover, an inclusive study is made to explore the effects of screening of plasma and quantum diffraction on various capture cross sections for a wide range of thermal Debye length and de Broglie wave length. It has been found that various cross sections suffer considerable changes due to varying Debye length and de Broglie wave length.

KEYWORDS

charge transfer, distorted wave method, proton-hydrogen collision, pseudopotential, semi-classical hydrogen plasma

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a common process that use to take place naturally in almost every astrophysical environment because of the abundant presence of atomic hydrogen in those environments.[1,2] Consequently, different kinds of important properties of the embedding environment are substantially regulated by this scattering process. Explanation of numerous phenomena associated with the embedding medium often requires the results of various cross sections (CS) of that process.[3,4] For example, explanation of profile and line intensities of absorption or emission of hydrogen atom requires the results of CSs.[4] As a matter of fact, a typical example of ion-atom scattering is the scattering of proton from hydrogen atom in which, depending on the energy, elastic, excitation, ionization, and rearrangement processes are possible to take place. Performing sophisticated quantum mechanical calculations on rearrangement scattering (also called electron or charge transfer process) is a challenging task, and thus the process has attracted the fancy of researchers[5–31] ever since the work of Oppenheimer in vacuum.[5] In plasma environments, reported investigations are relatively small.[20–22] Of late, the authors have investigated the following electron transfer process[22]:

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in classical non-ideal plasmas by using a distorted wave method.[9] It was found that collision dynamics of the above process suffered considerable changes due to varying non-ideality of the plasma.

In this paper, we focus our attention on the above mentioned electron transfer process in dense semi-classical partially ionized hydrogen plasma. Degree of denseness is important in determining the behaviours of plasma at short distances

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ORIGINAL ARTICLE

Charged strange star in $f(R, T)$ gravity with linear equation of state

Pramit Rej[1] · **Piyali Bhar**[2]

Received: 30 November 2020 / Accepted: 27 March 2021

Abstract Our present study involves the strange stars model in the framework of $f(R, T)$ theory of gravitation. We have taken a linear function of the Ricci scalar R and the trace T of the stress-energy tensor $T_{\mu\nu}$ for the expression of $f(R, T)$, i.e., $f(R, T) = R + 2\gamma T$ to obtain the proposed model, where γ is a coupling constant. Moreover, to solve the hydrostatic equilibrium equations, we consider a linear equation of state between the radial pressure p_r and matter density ρ as $p_r = \alpha\rho - \beta$, where α and β are some positive constants, Both α, β depend on coupling constant γ which have been also depicted in this paper. By employing the Krori-Barua *ansatz* already reported in the literature (J. Phys. A, Math. Gen. 8:508, 1975) we have found the solutions of the field equations in $f(R, T)$ gravity. The effect of coupling constant γ have been studied on the model parameters like density, pressures, anisotropic factor, compactness, surface redshift, etc. both numerically and graphically. A suitable range for γ is also obtained. The physical acceptability and stability of the stellar system have been tested by different physical tests, e.g., the causality condition, Herrera cracking concept, relativistic adiabatic index, energy conditions, etc. One can regain the solutions in Einstein gravity when $\gamma \to 0$.

Keywords General relativity · Compact star · $f(R, T)$ gravity · Causality condition

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1 Introduction

Recently, the LIGO/Virgo Collaboration announced the observation of a merger of a black hole with mass $23.2^{+1.1}_{-1.0}\ M_\odot$ with a compact object with mass $2.59^{+0.08}_{-0.09}\ M_\odot$ (Abbott et al. 2020), where the mass of the secondary component lies within the so-called low mass gap (Bailyn et al. 1998; Özel et al. 2010; Belczynski et al. 2012). Theoretical and observational evidence suggests that black holes of mass less than 5 $M_\odot$ may not be produced by stellar evolution (Özel et al. 2010; Belczynski et al. 2012; Farr et al. 2011). According to some candidate equations of state, a stable neutron star must have a mass of at most 3 $M_\odot$ (Müller and Serot 1996; Rhoades and Ruffini 1974; Özel et al. 2012; Kiziltan et al. 2013). If the mass exceeds this limit, it is hypothesized that neutrons lose their individuality under extreme pressure and breakdown into quarks. A quark star is smaller in size but ultra-dense as compared to the neutron star. However, increased pressure in its core stops quark stars from collapsing into black holes. Moreover, estimates of radii of some stellar objects (LMC X-4, 4U 1820-30, Her X-1, etc.) suggest that their structure and characteristics may be similar to that of strange quark stars. On the other hand, the relatively small tidal deformability measured in gravitational-wave signal GW170817 do not favor such large values of $M_{\max}$ but rather suggest it is of the order of 2.5 $M_\odot$ (Abbott et al. 2018, 2019). The heaviest neutron star observed to date has a mass of $2.01 \pm 0.04\ M_\odot$ (Antoniadis et al. 2013), and the existence of compact objects in the mass regime [2.5, 5] $M_\odot$ is highly uncertain.

From the pioneering work done by Ruderman (1972) it was already proposed that celestial bodies under certain conditions may become anisotropic. The author observed that relativistic particle interactions in a very dense nuclear matter medium could lead to the formation of anisotropies. In-

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Charged compact star in $f(R, T)$ gravity in Tolman–Kuchowicz spacetime

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Abstract In this current study, our main focus is on modeling the specific charged compact star SAX J 1808.4-3658 (M = 0.88 $M_{\odot}$, R = 8.9 km) within the framework of $f(R, T)$ modified gravity theory using the metric potentials proposed by Tolman–Kuchowicz (Tolman in Phys Rev 55:364, 1939; Kuchowicz in Acta Phys Pol 33:541, 1968) and the interior spacetime is matched to the exterior Reissner–Nordström line element at the surface of the star. Tolman–Kuchowicz metric potentials provide a singularity-free solution which satisfies the stability criteria. Here we have used the simplified phenomenological MIT bag model equation of state (EoS) to solve the Einstein–Maxwell field equations where the density profile (ρ) is related to the radial pressure (p_{r}) as $p_{\mathrm{r}}(r) = (\rho - 4B_{\mathrm{g}})/3$. Furthermore, to derive the values of the unknown constants a, b, B, C and the bag constant B_{g}, we match our interior spacetime to the exterior Reissner–Nordström line element at the surface of stellar system. In addition, to check the physical validity and stability of our suggested model we evaluate some important properties, such as effective energy density, effective pressures, radial and transverse sound velocities, relativistic adiabatic index, all energy conditions, compactness factor and surface redshift. It is depicted from our current study that all our derived results lie within the physically accepted regime which shows the viability of our present model in the context of $f(R, T)$ modified gravity.

1 Introduction

Einstein's General Relativity (GR) has continued to withstand the test of time in its predictions of physical phenomena within the realms of astrophysics and cosmology. From the classical predictions of the precession of Mercury's orbit and the deflection of starlight by a massive gravitating body to present day detection of gravitational waves and observations of black holes GR has triumphed. Early attempts seeking solutions of the Einstein field equations which describe stellar objects were crude and for most part unrealistic. The first exact solution of the Einstein field equations describing a self-gravitating sphere was obtained by Schwarzschild. The so-called interior Schwarzschild solution which described a constant density sphere suffered from various pathologies, the most notable being that the propagation speed for any signals within the fluid sphere was noncausal [1]. A survey of exact solutions appearing in the literature describing stellar objects by Delgaty and Lake [2] revealed that only a small subset of solutions meet the rigorous tests for physical viability, regularity and stability of fluid spheres.

The search for more realistic stellar models within GR required researchers to connect the macroscopic properties of stars determined through observations to the microphysics. A new era of stellar modeling was born, which went beyond the mathematical excursion of the Einstein field equations where ad hoc assumptions were made just to generate a toy model. Standard approaches which included assumptions on the metric function, density profiles, pressure profiles, anisotropy parameter and even the matter content which allowed for the system of equations to be integrated gave way to well-motivated techniques intrinsically connected to physics which include an equation of state (EoS), mass profiles linked to surface redshift and compactness of typical stellar structures. The linear EoS which links the radial pressure to the energy density has been generalized to include the microphysics (at least on a phenomenological level) via the so-called MIT bag model. The departure from pressure isotropy makes the modeling of stellar objects mathematically tractable. Imposing a barotropic EoS of the form $p_{\mathrm{r}} =$

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Charged gravastar model in $f(T)$ gravity admitting conformal motion

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In this paper, model of charged gravastar under $f(T)$ modified gravity is obtained. The model has been explored by taking the diagonal tetrad field of static spacetime together with electric charge. To solve the Einstein–Maxwell field equations, along with $f(T)$ gravity, we assume the existence of a conformal Killing vector which relates between geometry and matter through the Einstein–Maxwell field equations by an inheritance symmetry. We study several cases of interest to explore physically valid features of the solutions. Some physical properties of the model are discussed and we match our interior spacetime to the exterior Reissner–Nordström spacetime in presence of thin shell.

Keywords: General relativity; $f(T)$ gravity; gravastar; junction condition.

Mathematics Subject Classification 2020: 83C20, 83D05, 85A15

1. Introduction

In modern cosmology, one of the most important problems is to deal with the dark energy issue which causes the accelerating expansion of the Universe. This phenomenon has been confirmed by numerous observations of large scale structure [1,2] and measurements of the cosmic microwave background (CMB) anisotropy [3, 4]. The source that drives this cosmic acceleration is termed as 'dark energy' and it possesses positive energy density but negative pressure. It is well known that this form of energy acts as a repulsive gravitational force so that in General Relativity (GR) one needs to consider a further non-standard fluid with a negative pressure

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Relativistic compact stars in Tolman spacetime via an anisotropic approach

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Abstract In this present work, we have obtained a singularity-free spherically symmetric stellar model with anisotropic pressure in the background of Einstein's general theory of relativity. The Einstein's field equations have been solved by exploiting Tolman *ansatz* [Richard C Tolman, Phys. Rev. 55:364, 1939] in $(3+1)$-dimensional space-time. Using observed values of mass and radius of the compact star PSR J1903+327, we have calculated the numerical values of all the constants from the boundary conditions. All the physical characteristics of the proposed model have been discussed both analytically and graphically. The new exact solution satisfies all the physical criteria for a realistic compact star. The matter variables are regular and well behaved throughout the stellar structure. Constraints on model parameters have been obtained. All the energy conditions are verified with the help of graphical representation. The stability condition of the present model has been described through different testings.

1 Introduction

Stellar evolution predicts that when the nuclear fuel gets exhausted, the stars turn into highly dense compact objects such as white dwarf, neutron star or back hole. Massive stars undergoing the supernova explosion turn into neutron star and black hole. For neutron star, the main idea is that the gravitational collapse is supported by the neutron degeneracy pressure. The general perception is that for high densities at the core, nucleons have to converted to hyperons or either form condensates. Some studies predict that these nucleons could form Cooper pairs and can be in superfluid state. Based on the MIT bag model, Witten [1] provides the existence of strange quark matter, which indicates that the quarks inside the compact objects might not be in a confined hadronic state. At the high densities and pressures they could form a larger colorless region with equal part of up, down and strange quarks. Consequently, the composition of the core region of compact objects is still an open subject in relativistic astrophysics.

When densities of compact stars are greater than the nuclear matter density, it expects the appearance of unequal principal stresses, called anisotropic effect. This usually means that the radial pressure component p_r is not equal to the transverse component p_t. The presence of anisotropy was first predicted for self-gravitating objects in Newtonian regime by Jeans [2]. Later, Lemaitre [3] considered the local anisotropy effect in the context of general relativity and showed that the presence of anisotropy can change the upper limits on the maximum value of the surface gravitational potential. Ruderman [4] showed that a compact star with matter density ($\rho > 10^{15}$g cm^{-3}), where the nuclear interaction become relativistic in nature, is likely to be anisotropic. Herrera [5] presented the evidence on the appearance of local anisotropy in self gravitating systems in both Newtonian and general relativistic context. Since then, a lot of investigations have been carried out in finding new exact solutions with anisotropy feature.

For half of century, the theory of anisotropic compact stars in General Relativity has been developed. Bower and liang [6] provided the generalization of Tolman–Oppenheimer–Volkov equation in presence of anisotropy. The stability of a stellar model can be enhanced by a presence of a repulsive anisotropic force when $\Delta = p_t - p_r > 0$. This feature leads to more compact stable configurations compare to

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Finch–Skea star model in $f(R,T)$ theory of gravity

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This work discusses about the existence of compact star model in the context of $f(R,T)$ gravity with R as the Ricci scalar and T as the trace of energy–momentum tensor $T_{\mu\nu}$. The model has been developed by considering the spherically symmetric spacetime consisting of isotropic fluid with $f(R,T) = R + 2\beta T$ with β be the coupling parameter. The corresponding field equations are solved by choosing the well-known Finch–Skea *ansatz* [M. R. Finch and J. E. F. Skea, A realistic stellar model based on an ansatz of Duorah and Ray, *Class. Quantum Gravity* **6**(4) (1989) 467–476]. For spacetime continuity, we elaborate the boundary conditions by considering the exterior region as Schwarzschild metric. The unknown constants appearing in the solution are evaluated for the compact star PSR J 1614-2230 for different values of coupling constant. The physical properties of the model, e.g. matter density, pressure, stability, etc. have been discussed both analytically and graphically. This analysis showed that the geometry and matter are compatible with each other as well as the model is in stable equilibrium in the context of $f(R, T)$ modified gravity.

Keywords: Compact objects; $f(R,T)$ gravity; stability.

Mathematics Subject Classification 2020: 83C05, 83D05, 85A05, 85A15

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Spatio-Temporal Variations of Block Wise Rural Sex Ratio of Hooghly District in West Bengal (2001-2011)

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Abstract

Sex ratio is an important demographic index to access the social perception of the population of a region. It varies from one place to another and also changes from time to time depending on the socio economic progress of a region. The district of Hooghly located in the lower Ganga plane of West Bengal has a reach socio-cultural heritage as well as economic prosperity. However, the rural population in most part of the district are not so aware of the multiplications but still the imbalances are for more natural in occurrence. All these have been observed in the census year 2001 and 2011.

Keywords

Rural sex ratio; literate sex ratio; crude sex-ratio; worker sex-ratio; social perception.

Introduction

Demography is an indispensable part of geographical studies and sex ratio is one of the vital demographic attributes for any region. It affect the social, economic and political structure of a nation **(Saha and Debnath, 2016)**. Sex ratio is also an index of the socio-economic conditions prevailing in an area and is a useful tool for regional analysis **(Franklin, 1956)**. In Indian perspective sex ratio is measured in terms of number of females per thousand males. Since the two sexes play partly contrasting and partly complementary roles in the economy and society, the study of sex composition assumes added significance for a population geographer **(Chandna, 2007)**.So far the national scenario of the spatial distribution of sex ratio is concerned, it is found that the states of southern part of India have more than the national average while the northern and central part of the country are far behind from the national average**(Census, 2001 and 2011)**. As the northern states are highly populated so it can be realised that a huge portion area of total population of the country experiences a deficit sex ratio. The same trend continued during the last two census years 2001 and 2011.Reasons behind low female sex ratio in Indian scenario are gender discrimination (preference for son), discrimination against girl child, failure of stringent laws, MTP (abortion), female feticide

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Assessment of Agricultural Economy and Livelihood: A Case Study of Chandinagar Mouza, Hooghly District, West Bengal

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Abstract

Presently micro-level studies play a key role to measure the spatial differentiation as each space has its criterion that determines the differentiation. The study area is concentrated within mouza level. Chandinagar mouza is situated within Jangipara block in Hooghly district of West Bengal. Being a part of the rural area along with the vast agricultural field, agriculture is the livelihood of the people of the mouza. Most of the people are engaged in agricultural practices which is the driving force of the rural economy. The focus of the study is to find the interrelationship between the agrarian economy and the involvement of the people in it. Moreover, the feelings and mental attachment to agriculture are also taken into consideration.

Introduction

India is predominantly known for its riverine civilization since the ancient period. Over 60% of India's land area is arable making it the second-largest country in terms of total arable land (Goyel, 2016). Agriculture plays a vital role in India's economy. About 54.6% of the total population is engaged in agriculture and allied activities (Census 2011). Gross Value Added (GVA) at current prices for agriculture, forestry and fishing contributed 17.02% of national GVA in 2017-18 (MSPI, GOI, 2018-19). Contribution of agriculture, forestry and fishing in Indian economy is much higher than the world average of 3.4% in 2017 (World Bank, 2020).

In the beginning of the 21st Century, Indian farming shows a significant shift from traditional farming to modern commercial farming due to the availability and growth of infrastructural facilities like HYV seeds, chemical fertilizers, irrigation, pesticides, marketing, transport and Govt. extension programmes. Small and marginal farmers constitute a major portion of rural agricultural sector. So transformation of agriculture through modernization is positively related to sustainable livelihood of rural population (Mondal, Chakraborty and Mishra, 2017). The rural people in Indian scenario have traditionally accepted agriculture initially to fulfil the requirement of food for their families or to meet up the occupational demand, and thus, a bridge of affinity has been built between the farmer and soil. Agriculture in India is more a 'way of life' than a 'mode of business' (Goyel, 2016).

West Bengal is predominantly an agrarian State. Comprising of only 2.7% of India's geographical area, it supports nearly 8% of its population. There are 71.23 lakh farm families of whom 96% are small and marginal farmers. The average size of land holding is only 0.77 ha. However, the State is bestowed with diverse natural resources and varied agro-climatic conditions which support cultivation of a wide range of crops. The net cropped area is 52.05 lakh ha which comprises 68% of the geographical area and 92% of arable land. The cropping intensity is 184%. However, as the State is located in the humid tropic and the Bay of Bengal is close by, it has to often face vagaries of nature like flood, cyclone, hailstorm etc. Though the State has a surplus production of rice, vegetables and potato, a huge gap exists

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Basic Features and Strategies of Women's Empowerment of a Developing Urban Area – A Case Study of Memari Municipality, Purba Bardhaman, West Bengal, India

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ABSTRACT

Women's Empowerment is a holistic and sustainable goal for development of a society. They are the resources of family, society, community and nation. They are the greatest asset of an economy. Urbanization processes are not properly guided their roles in this society. Transformation of gender roles in urban contexts will require wider community involvement as well as administration. They are disadvantaged in income poverty, asset poverty, time and power. This paper is properly focused on features of empowerment of women in this society, their educational status, employment opportunities, social and economic status, as well as future strategies.

KEYWORDS: *Empowerment, Employment, Equality, Correlation, Census, Education, Workers*

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I. INTRODUCTION:

In a particular situation, offering power or authority to powerless is called empowerment. According to Kebber (2001), Empowerment is "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them. She explained that it is the process through which people's awareness, confidence, ability to solve problems, gaining access to resource and public facilities are increased. **The World Bank** defines empowerment as "the process of increasing the capacity of individuals or groups to make choice and transform those choices into desired actions and outcomes. Central to this process is actions which both build individual and collective assets and improve the efficiency and fairness of the organization and individual context which govern the use of these assets".

Generally, empowering of women is called women's empowerment. Women's empowerment is the process whereby women become able to organize themselves to increase their self reliance, to assert their independent rights to make choices and control resources which will assist in challenging and eliminating their own subordination. (Keller and Mbwewe, 1991 cited in Rowlands, 1995).The empowerment and autonomy of women and the improvement of their political, social, economic and health status is highly important end in itself. In addition, it is essential for the achievement of sustainable development [United Nations Population Fund (UNFPA), International Conference on Population and Development (ICPD), Power of Attorney (POA), Communications Audio Interface for Remote Operations (CAIRO), 1994]. . In UNDP Human Development Report, 1995, women's empowerment is the expansion of choices for women and an increase in the women's ability to exercise choices. Women must be considered as the agent of development rather than target of development agencies (R. India and Deepak Kumar Behra, 1999). According to Swami Vivekananda, "....there is no chance for the welfare of the world unless the condition of the women is improved. It is not possible for the bird to fly on one wing"(Yojana, August, 2001).Empowerment of women develops them as more aware individuals, who are politically active, economically productive and independent and are able to make intelligent decision in matters that affect them and their nations. (Lillikutty, 2003).

II. BACKGROUND OF THE STUDY:

According to working paper of **World Bank**, Alsop, et al (2005), empowerment is the enhancing of the individual's or group's capacity to make choices and transform those choices into desire actions and outcomes. In **Millennium**

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CLUSTER DEVELOPMENT PROGRAMME IN THE MSME SECTOR: EVIDENCE FROM WEST BENGAL

Dr. Rintu Nath*

Abstract

MSME sector is well-regarded as the backbone of the country's manufacturing output is facing a stiff competition from large scale manufacturers as well as MNCs. In such circumstances, CDP is an important platform and one of the finest schemes for the MSMEs. The key objectives of this scheme are to enhance productivity and capacity building of the MSMEs. Also, strengthen enterprises to combat internal challenges and external threats of the today's competitive business climate. The purpose of this study is to evaluate the impact of CDP on select MSME clusters in West Bengal, using 8 selected clusters across the state of West Bengal as case study. In order to understand the study aim, the entire study has divided into four sections. It starts with introduction; overview of CDP in the MSME sector in West Bengal is discussed in next section, followed by examination of the impact of CDP on select MSME clusters in West Bengal and finally, concludes the study. The study is based on case study of the eight selected clusters in West Bengal which already have received soft interventions of CDP. A qualitative research approach of the data collection is adopted using a questionnaire comprising of 4 questions relating to soft interventions. Based on this sample comprises of 399 respondents, the results obtained that CDP has a positive effect on MSMEs. The findings can prove useful to the MSME department and its policy makers, new entrepreneurs, researchers, as well as government and academic institutions.

Keywords: *MSME, interventions, clusters, academic*

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CDP ACTS AS DRIVING FORCE TO THE MSME SECTOR A CASE STUDY OF FAN CLUSTER IN WEST BENGAL

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Abstract

MSME sector well-regarded as the backbone of the country is facing with huge problems in connection with fund, technology, demand and efficiency. CDP acts as safeguard mechanism to the MSME sector which is generating second largest employment. The purpose of this study is to evaluate the effects of CDP on capacity building of the MSMEs, using electric fans industry in Kolkata, West Bengal as case study. Based on this sample, the results obtained indicate that CDP has a clear effect on the capacity building of the MSMEs. MSMEs have been immensely benefitted in terms of productivity and competitiveness from various capacity building measures. The findings can prove useful to MSME department and its policy makers, new entrepreneurs, researchers, as well as government and academic institutions.

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) are the growth accelerators and considered as the 'backbone of the Indian economy.' In spite of sizeable contribution to the economy, this sector is struggling for existence because of facing stiff competitions from large scale manufacturers as well as global corporations. In such circumstances, Cluster Development Programme (CDP) is an excellent platform and one of the finest schemes for the MSMEs in order to safeguard this sector properly. CDP acts as catalyst for channelizing the necessary resources in a social network towards enhancement of building confidence and competitiveness of this sector. The key objectives of CDP are to increase productivity and capacity building of the MSMEs. It also strengthens enterprises to combat internal challenges and to defeat global threats of the today's competitive business climate. CDP has its two successive interventions namely soft and hard interventions. CDP protects MSMEs through soft interventions or to build up soft skills development and hard interventions or to build up the common facility Centre (CFC).

The purpose of this study is to examine the effects of CDP on capacity building of the MSMEs, using electric fans cluster in Kolkata, West Bengal as case study. In order to understand

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EDITOR'S CHOICE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in dense semi-classical hydrogen plasma

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Abstract

Quantum mechanical calculations have been accomplished to study the dynamics of the reaction: $p + H(1s) \rightarrow H(nlm) + p$ in dense semi-classical hydrogen plasma. Interactions among the charged particles in plasma are represented by a pseudopotential which takes care of the collective effects at large distances and quantum effect of diffraction at small distances. Various capture cross sections are computed for the incident proton energy lying within 10 to 500 keV by applying a distorted wave method which uses a variationally determined closed-form wave function of hydrogen atom. Moreover, an inclusive study is made to explore the effects of screening of plasma and quantum diffraction on various capture cross sections for a wide range of thermal Debye length and de Broglie wave length. It has been found that various cross sections suffer considerable changes due to varying Debye length and de Broglie wave length.

KEYWORDS

charge transfer, distorted wave method, proton-hydrogen collision, pseudopotential, semi-classical hydrogen plasma

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a common process that use to take place naturally in almost every astrophysical environment because of the abundant presence of atomic hydrogen in those environments.[1,2] Consequently, different kinds of important properties of the embedding environment are substantially regulated by this scattering process. Explanation of numerous phenomena associated with the embedding medium often requires the results of various cross sections (CS) of that process.[3,4] For example, explanation of profile and line intensities of absorption or emission of hydrogen atom requires the results of CSs.[4] As a matter of fact, a typical example of ion-atom scattering is the scattering of proton from hydrogen atom in which, depending on the energy, elastic, excitation, ionization, and rearrangement processes are possible to take place. Performing sophisticated quantum mechanical calculations on rearrangement scattering (also called electron or charge transfer process) is a challenging task, and thus the process has attracted the fancy of researchers[5–31] ever since the work of Oppenheimer in vacuum.[5] In plasma environments, reported investigations are relatively small.[20–22] Of late, the authors have investigated the following electron transfer process[22]:

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in classical non-ideal plasmas by using a distorted wave method.[9] It was found that collision dynamics of the above process suffered considerable changes due to varying non-ideality of the plasma.

In this paper, we focus our attention on the above mentioned electron transfer process in dense semi-classical partially ionized hydrogen plasma. Degree of denseness is important in determining the behaviours of plasma at short distances

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ORIGINAL ARTICLE

Charged strange star in $f(R, T)$ gravity with linear equation of state

Pramit Rej[1] · **Piyali Bhar**[2]

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Abstract Our present study involves the strange stars model in the framework of $f(R, T)$ theory of gravitation. We have taken a linear function of the Ricci scalar R and the trace T of the stress-energy tensor $T_{\mu\nu}$ for the expression of $f(R, T)$, i.e., $f(R, T) = R + 2\gamma T$ to obtain the proposed model, where γ is a coupling constant. Moreover, to solve the hydrostatic equilibrium equations, we consider a linear equation of state between the radial pressure p_r and matter density ρ as $p_r = \alpha\rho - \beta$, where α and β are some positive constants, Both α, β depend on coupling constant γ which have been also depicted in this paper. By employing the Krori-Barua *ansatz* already reported in the literature (J. Phys. A, Math. Gen. 8:508, 1975) we have found the solutions of the field equations in $f(R, T)$ gravity. The effect of coupling constant γ have been studied on the model parameters like density, pressures, anisotropic factor, compactness, surface redshift, etc. both numerically and graphically. A suitable range for γ is also obtained. The physical acceptability and stability of the stellar system have been tested by different physical tests, e.g., the causality condition, Herrera cracking concept, relativistic adiabatic index, energy conditions, etc. One can regain the solutions in Einstein gravity when $\gamma \to 0$.

Keywords General relativity · Compact star · $f(R, T)$ gravity · Causality condition

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1 Introduction

Recently, the LIGO/Virgo Collaboration announced the observation of a merger of a black hole with mass $23.2^{+1.1}_{-1.0}\ M_\odot$ with a compact object with mass $2.59^{+0.08}_{-0.09}\ M_\odot$ (Abbott et al. 2020), where the mass of the secondary component lies within the so-called low mass gap (Bailyn et al. 1998; Özel et al. 2010; Belczynski et al. 2012). Theoretical and observational evidence suggests that black holes of mass less than 5 $M_\odot$ may not be produced by stellar evolution (Özel et al. 2010; Belczynski et al. 2012; Farr et al. 2011). According to some candidate equations of state, a stable neutron star must have a mass of at most 3 $M_\odot$ (Müller and Serot 1996; Rhoades and Ruffini 1974; Özel et al. 2012; Kiziltan et al. 2013). If the mass exceeds this limit, it is hypothesized that neutrons lose their individuality under extreme pressure and breakdown into quarks. A quark star is smaller in size but ultra-dense as compared to the neutron star. However, increased pressure in its core stops quark stars from collapsing into black holes. Moreover, estimates of radii of some stellar objects (LMC X-4, 4U 1820-30, Her X-1, etc.) suggest that their structure and characteristics may be similar to that of strange quark stars. On the other hand, the relatively small tidal deformability measured in gravitational-wave signal GW170817 do not favor such large values of $M_{\max}$ but rather suggest it is of the order of 2.5 $M_\odot$ (Abbott et al. 2018, 2019). The heaviest neutron star observed to date has a mass of $2.01 \pm 0.04\ M_\odot$ (Antoniadis et al. 2013), and the existence of compact objects in the mass regime [2.5, 5] $M_\odot$ is highly uncertain.

From the pioneering work done by Ruderman (1972) it was already proposed that celestial bodies under certain conditions may become anisotropic. The author observed that relativistic particle interactions in a very dense nuclear matter medium could lead to the formation of anisotropies. In-

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Charged compact star in $f(R, T)$ gravity in Tolman–Kuchowicz spacetime

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Abstract In this current study, our main focus is on modeling the specific charged compact star SAX J 1808.4-3658 (M = 0.88 $M_{\odot}$, R = 8.9 km) within the framework of $f(R, T)$ modified gravity theory using the metric potentials proposed by Tolman–Kuchowicz (Tolman in Phys Rev 55:364, 1939; Kuchowicz in Acta Phys Pol 33:541, 1968) and the interior spacetime is matched to the exterior Reissner–Nordström line element at the surface of the star. Tolman–Kuchowicz metric potentials provide a singularity-free solution which satisfies the stability criteria. Here we have used the simplified phenomenological MIT bag model equation of state (EoS) to solve the Einstein–Maxwell field equations where the density profile (ρ) is related to the radial pressure (p_{r}) as $p_{\mathrm{r}}(r) = (\rho - 4B_{\mathrm{g}})/3$. Furthermore, to derive the values of the unknown constants a, b, B, C and the bag constant B_{g}, we match our interior spacetime to the exterior Reissner–Nordström line element at the surface of stellar system. In addition, to check the physical validity and stability of our suggested model we evaluate some important properties, such as effective energy density, effective pressures, radial and transverse sound velocities, relativistic adiabatic index, all energy conditions, compactness factor and surface redshift. It is depicted from our current study that all our derived results lie within the physically accepted regime which shows the viability of our present model in the context of $f(R, T)$ modified gravity.

1 Introduction

Einstein's General Relativity (GR) has continued to withstand the test of time in its predictions of physical phenomena within the realms of astrophysics and cosmology. From the classical predictions of the precession of Mercury's orbit and the deflection of starlight by a massive gravitating body to present day detection of gravitational waves and observations of black holes GR has triumphed. Early attempts seeking solutions of the Einstein field equations which describe stellar objects were crude and for most part unrealistic. The first exact solution of the Einstein field equations describing a self-gravitating sphere was obtained by Schwarzschild. The so-called interior Schwarzschild solution which described a constant density sphere suffered from various pathologies, the most notable being that the propagation speed for any signals within the fluid sphere was noncausal [1]. A survey of exact solutions appearing in the literature describing stellar objects by Delgaty and Lake [2] revealed that only a small subset of solutions meet the rigorous tests for physical viability, regularity and stability of fluid spheres.

The search for more realistic stellar models within GR required researchers to connect the macroscopic properties of stars determined through observations to the microphysics. A new era of stellar modeling was born, which went beyond the mathematical excursion of the Einstein field equations where ad hoc assumptions were made just to generate a toy model. Standard approaches which included assumptions on the metric function, density profiles, pressure profiles, anisotropy parameter and even the matter content which allowed for the system of equations to be integrated gave way to well-motivated techniques intrinsically connected to physics which include an equation of state (EoS), mass profiles linked to surface redshift and compactness of typical stellar structures. The linear EoS which links the radial pressure to the energy density has been generalized to include the microphysics (at least on a phenomenological level) via the so-called MIT bag model. The departure from pressure isotropy makes the modeling of stellar objects mathematically tractable. Imposing a barotropic EoS of the form $p_{\mathrm{r}} =$

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Charged gravastar model in $f(T)$ gravity admitting conformal motion

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In this paper, model of charged gravastar under $f(T)$ modified gravity is obtained. The model has been explored by taking the diagonal tetrad field of static spacetime together with electric charge. To solve the Einstein–Maxwell field equations, along with $f(T)$ gravity, we assume the existence of a conformal Killing vector which relates between geometry and matter through the Einstein–Maxwell field equations by an inheritance symmetry. We study several cases of interest to explore physically valid features of the solutions. Some physical properties of the model are discussed and we match our interior spacetime to the exterior Reissner–Nordström spacetime in presence of thin shell.

Keywords: General relativity; $f(T)$ gravity; gravastar; junction condition.

Mathematics Subject Classification 2020: 83C20, 83D05, 85A15

1. Introduction

In modern cosmology, one of the most important problems is to deal with the dark energy issue which causes the accelerating expansion of the Universe. This phenomenon has been confirmed by numerous observations of large scale structure [1,2] and measurements of the cosmic microwave background (CMB) anisotropy [3, 4]. The source that drives this cosmic acceleration is termed as 'dark energy' and it possesses positive energy density but negative pressure. It is well known that this form of energy acts as a repulsive gravitational force so that in General Relativity (GR) one needs to consider a further non-standard fluid with a negative pressure

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Relativistic compact stars in Tolman spacetime via an anisotropic approach

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Abstract In this present work, we have obtained a singularity-free spherically symmetric stellar model with anisotropic pressure in the background of Einstein's general theory of relativity. The Einstein's field equations have been solved by exploiting Tolman *ansatz* [Richard C Tolman, Phys. Rev. 55:364, 1939] in $(3+1)$-dimensional space-time. Using observed values of mass and radius of the compact star PSR J1903+327, we have calculated the numerical values of all the constants from the boundary conditions. All the physical characteristics of the proposed model have been discussed both analytically and graphically. The new exact solution satisfies all the physical criteria for a realistic compact star. The matter variables are regular and well behaved throughout the stellar structure. Constraints on model parameters have been obtained. All the energy conditions are verified with the help of graphical representation. The stability condition of the present model has been described through different testings.

1 Introduction

Stellar evolution predicts that when the nuclear fuel gets exhausted, the stars turn into highly dense compact objects such as white dwarf, neutron star or back hole. Massive stars undergoing the supernova explosion turn into neutron star and black hole. For neutron star, the main idea is that the gravitational collapse is supported by the neutron degeneracy pressure. The general perception is that for high densities at the core, nucleons have to converted to hyperons or either form condensates. Some studies predict that these nucleons could form Cooper pairs and can be in superfluid state. Based on the MIT bag model, Witten [1] provides the existence of strange quark matter, which indicates that the quarks inside the compact objects might not be in a confined hadronic state. At the high densities and pressures they could form a larger colorless region with equal part of up, down and strange quarks. Consequently, the composition of the core region of compact objects is still an open subject in relativistic astrophysics.

When densities of compact stars are greater than the nuclear matter density, it expects the appearance of unequal principal stresses, called anisotropic effect. This usually means that the radial pressure component p_r is not equal to the transverse component p_t. The presence of anisotropy was first predicted for self-gravitating objects in Newtonian regime by Jeans [2]. Later, Lemaitre [3] considered the local anisotropy effect in the context of general relativity and showed that the presence of anisotropy can change the upper limits on the maximum value of the surface gravitational potential. Ruderman [4] showed that a compact star with matter density ($\rho > 10^{15}$g cm^{-3}), where the nuclear interaction become relativistic in nature, is likely to be anisotropic. Herrera [5] presented the evidence on the appearance of local anisotropy in self gravitating systems in both Newtonian and general relativistic context. Since then, a lot of investigations have been carried out in finding new exact solutions with anisotropy feature.

For half of century, the theory of anisotropic compact stars in General Relativity has been developed. Bower and liang [6] provided the generalization of Tolman–Oppenheimer–Volkov equation in presence of anisotropy. The stability of a stellar model can be enhanced by a presence of a repulsive anisotropic force when $\Delta = p_t - p_r > 0$. This feature leads to more compact stable configurations compare to

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Finch–Skea star model in $f(R,T)$ theory of gravity

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This work discusses about the existence of compact star model in the context of $f(R,T)$ gravity with R as the Ricci scalar and T as the trace of energy–momentum tensor $T_{\mu\nu}$. The model has been developed by considering the spherically symmetric spacetime consisting of isotropic fluid with $f(R,T) = R + 2\beta T$ with β be the coupling parameter. The corresponding field equations are solved by choosing the well-known Finch–Skea *ansatz* [M. R. Finch and J. E. F. Skea, A realistic stellar model based on an ansatz of Duorah and Ray, *Class. Quantum Gravity* **6**(4) (1989) 467–476]. For spacetime continuity, we elaborate the boundary conditions by considering the exterior region as Schwarzschild metric. The unknown constants appearing in the solution are evaluated for the compact star PSR J 1614-2230 for different values of coupling constant. The physical properties of the model, e.g. matter density, pressure, stability, etc. have been discussed both analytically and graphically. This analysis showed that the geometry and matter are compatible with each other as well as the model is in stable equilibrium in the context of $f(R, T)$ modified gravity.

Keywords: Compact objects; $f(R,T)$ gravity; stability.

Mathematics Subject Classification 2020: 83C05, 83D05, 85A05, 85A15

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The Growth And Development Of Children's Literature In Australia: A Brief Survey

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ABSTRACT

This paper proposes to historically chart the initiation, growth and development of the writings for children in the field of Australian Literature. This includes commentary and critical analysis of the persepectives representations in the works of the White and Aboriginal Australian authors and the crosscurrents involved in the process.

KEYWORDS children's literature, Australian literature, White Australian Authors, Aboriginal Australian Authors.

Introduction

In Australian literature, the settlement discourses related to the establishment of Australia and related adventure stories dominate the initial phase. Rhonda M. Bunbury observes, "The origins of published children's literature in Australia actually lie within the efforts of the monocultured, class-bound English who were conscious of the need to bring civilisation to children of a convict colony" (833). Such White-authored texts were caught up in a tension between two kinds of needs. Bradford observes that on the one hand there was the need "to position child readers as young Australians; and on the other [to] manage the colonial past for children" (Reading Race 15). The "strategies of silence and concealment" practised by White authors for this purpose is exemplified in Eve Pownall's The Australia Book (1951) that received the Australian Children's Book Council's 'Book of the Year' award in 1952 (Braford 15). Illustrated by Margaret Senior, this book is accepted as one of the canonical history books for children. Being a history book for White children, it is concerned with representation of childhood, though the way history is presented to the White children also becomes crucial here. The history here begins only with the arrival of the Whites and gives an impression "as though the country was lost in a kind of limbo before being found [by White men], as though untamed and untouched by humans before being settled" (Bradford Reading Race 18). Such mechanism of placing and allowing strategic gaps and omissions for the sake of presenting a benign myth of Australian settlement history to the young readers continued in the school texts and readers, too, that prevailed under the leadership of State Departments of Education. Exploration narratives were accompanied here with maps which were constructed to show the journeys in uninhabited territories. Exploration and adventure narratives, whether written by male or female White authors, were also explicitly discriminatory about gender issues. Since these works represented the imperial

enterprise of discovering new lands as a purely masculine affair, women figures were rarely to be found in them. Examples are Anne Bowman's The Kangaroo Hunters (1859), Edward B. Kennedy's Blacks and Bushrangers (1889) and Hesba Brinsmead's Longtime Passing (1971) where women adorn only the familial domestic space to which the male heroes come back to receive nursing for the bruises they get in fighting with Aborigines during their journeys. These works reiterate the issues of stereotypical masculinity and racial dominance to the White children readers. Captivity narratives of Eliza Fraser and others reiterate in an autobiographic mode the savagery of Aborigines while the Aboriginal autobiographies, like Sally Morgan's My Place (1987), Robert Bropho's The Fringedweller (1980) present the other side of the frontier of White settlement in Australia. Religious texts, however, credited the existence of Aborigines only to depict their development through conversion into Christianity which was identified with "government policies and strategies for managing Aborigines" (Bradford Reading Race 48). Narratives of conversion were common in White authored texts like E. Davenport Cleland's The White Kangaroo (1890) and George Sargent's Frank Layton (1865). In general, there is a common trend of poor treatment of Aborigines and Aboriginal themes with stereotypical Aboriginal and White characters in all these works. The young White readers were provided only with the non-Aboriginal dominant adult viewpoints emphasising the strange and exotic elements about Aboriginality.

During the early years of White settlement in Australia, children's literature – both for school textbooks and for other books – was solely dependent on the supply of books authored and published in Britain. Such supply naturally had nothing to contribute to the idea of Australianness among the readers. Till 1950s, the purpose of the school readers, published by the Education Departments, was, as Charles Long mentions in Victorian Readers, "to be taken in imagination to various parts of the empire, to Europe, and to the United States of America, and thus to gain knowledge of their rich heritage and acquire a well-founded pride of race" (qtd. in Bradford Reading Race 290). Clare Bradford points out that the first ever children's book to be published in Australia—A Mother's Offering to Her Children (1841) by Charlotte Burton—was almost after a century from the initiation of children's literature publication in Britain in 1744 with A Little Pretty Pocket Book by British publisher John Newbery (Reading Race 283).

A Mother's Offering to Her Children records the conversations of a White mother and her children about the geographical, natural and cultural aspects of Australia and its natives in a didactic mode. Addressed to White children, the descriptions here are "of a cultured British migrant viewing the new land through British eyes" (Bradford Reading Race 285). A Mother's Offering to Her Children is also an example of such female authored texts where the White authors create the images of good mothers, "concerned with the feminine work of educating the young", only to contrast with the images of Aboriginal mothers to show the "gulf between civilisation and savagery" (Bradford Reading Race 83).

During this early stage, narratives of adventurous expeditions, shipwreck and finally of kidnap and captivity in the hands of the Aborigines carried out the purpose of informing the intended young White readers about the real nature of the new land. In these works, Aborigines are represented sometimes as "barbaric figures intent on murdering travellers", sometimes as "comic relief", "good natives" or as "half-caste, or brown child [...] torn between two cultures because of mixed racial heritage" (Bradford Reading Race 287). Jeannie Gunn's The Little Black Princess (1905) represents the otherness of Aboriginal childhood as amusing to the implied young White readers. Here the depiction of Aborigines as inferior human beings, according to Bradford, "positions readers as young colonials" (Reading Race 287). Richard Rowe's The Boy in the Bush (1869) is an adventure story where the Aborigines are portrayed as "generally savages, cannibals" (Bradford Reading Race 6). Ethel Turner's Seven Little Australians (1894), published from England, tries to explore the Australianness by exploring the bush culture. The story of the novel centres round the escapades of the children of a White family and their subsequent adventures. Instead of being murderous, Aborigines here are seen to be helpful in conformity with the "colonial trope of loyal black servant who demonstrates the benevolence of his masters" (Bradford Reading Race 288). Clare Bradford points out that an Aboriginal story, which was originally a part of the book in its 1894 edition, was omitted in the edition of 1900 (Reading Race 4). This omission is actually an act of appropriation by "institutional gatekeepers" and exemplifies the susceptibility of White representation of Aboriginality to Western perspectives (MacCann xviii). Portrayals and treatments of settlement violence history and issues relating to contact of cultures have since been remaining a matter of concern for authors of Australian children's literature.

Another kind of depiction of the bush life and culture is found in Mary Grant Bruce's the Billabong books series which was initiated by the publication of A Little Bush Maid in 1910. The compilation of fifteen books in this series published as Billabong Riders in 1942 stood as a great rival of the popularity of the works of Turner who kept writing till 1928. Billabong series shows the reformative journey of city-dwelling characters through their bush experiences at Billabong that represents real Australia, exoticised according to the European perceptions. The representation of Aboriginal childhood here is much like a continuation of Turner's works and is in accordance with the hierarchies of race, gender and class. Angus & Robertson republished the Billabong series in 1993 with new illustrations. Apart from a pointer to its popularity, this event of republication is also important as the text was modified in 1993 to omit "offensive expressions" about Aboriginality (Bradford Reading Race 41). This event of omission is ideologically just the opposite to the omission of the Aboriginal story from Seven Little Australians in 1900. Bradford observes that the "publisher's changes to the Billabong books also raise question about their views of the books' implied readers" as the readership of Aboriginal children multiplied between the years 1900 and 1993 (Reading Race 44).

Romance and fantasy fiction bore the common trend of White authors trying to inform non-Aboriginal readers about Aboriginal concepts, like the Dreaming, by positioning themselves as authorities of the culture. This resulted in stereotyping and Indigenising for the sake of exoticisation. Brooke Collins-Gearing in her essay "Imagining Indigenality in Romance and Fantasy Fiction for Children" comments that "representations of Indigenous culture and people in fantasy and romance narratives are based on narrative practices which are informed by Western society and its values" (32). Representation of Aboriginality and Aboriginal childhood is often motivated by the purpose of projecting Aborigines as a dying race and, for this, elements of Aboriginal culture are carefully selected or rejected in the narratives according to the moral, social and political scheme of the author. Mary A. Fitzgerald's King Bungaree's Pyalla and Stories Illustrative of Manners and Customs that Prevailed Among Australian Aborigines (1891) is one of the earliest examples of this kind of writing. Here the "narrative records Indigenality as belonging to a past time that is slowly vanishing, a construction which presents the idea that a harmonious, but brief, relationship existed in the early days of colonization between colonists and Indigenous peoples. In this way Fitzgerald's fantasy narratives about black/white relationships absolve non-Indigenous child readers from the memory and knowledge of policies and practices of genocide and assimilation" (Collins-Gearing 32). Situating romance and fantasy fictions in the past remained a common strategy among the authors even in twentieth century to avoid the contemporary issues. By taking advantage of the conventions of this genre, unspoilt and blissful pastoral representation of Aboriginal childhood is also found in the twentieth century. Frank Dalby Davison's Children of the Dark People (1936) is an example of such idyllic representations. Portrayal of settler's virtues employed to the betterment of Aborigines was another common trope in the fantasy fictions for children. Ethel Pedley's Dot and the Kangaroo (1899), May Gibbs's Snugglepot and Cuddlepie (1918), Norman Lindsay's The Magic Pudding (1918) and Dorothy Wall's Blinky Bill (1933) are examples where virtues of settler characters have been portrayed through anthropomorphised Australian animal characters.

The Children's Book of the Year Award which started in 1946 and the establishment of Children's Book Council of Australia (CBCA) in 1958 encouraged children's literature production and "by the 1990s at least one in ten books in Australian literature were written for children" (Bennett 257). Whitlam government's 'Multicultural Australia' policy, launched in 1973, gave the impetus to the publications of children's books promoting cultural diversity by exploring race relations to cater to the potential market of multicultural young consumers. Bradford observes that the "dying race" trope waned out in the second half of the twentieth century and Rex Ingamell's adventure narrative Aranda Boy (1952) exemplifies authentic representation of Aboriginal childhood in spite of adhering to principles of "white superiority" and "benevolent white rule" ("Australian Children's Literature" 297). Donnarae MacCann terms this attitude as "paternalistic racism" where "good intentions coupled with white standards, a white

perspective, and an assumption of white superiority" (xxvi-ii). Patricia Wrightson tried to replace the "Western metaethic[s]" of fantasy literature for children in An Older Kind of Magic (1972) and in her novels of the Wirrun trilogy—The Song of Wirrun-The Ice is Coming (1977), The Dark Bright Water (1979) and Behind the Wind (1981) (Stephens and McCallum 7).[1] In describing the adventures of Wirrun, the hero, she took honest efforts in employing "another kind of magic, a kind that must have been shaped by the land itself at the edge of Australian vision" (qtd. in Bradford "Australian Children's Literature" 297). These efforts were not always completely independent of European influences which gave way slowly to more and more realistic representations of White-Aboriginal race relations that are found in the literature produced from 1990s onwards in the writings of James Moloney, Phillip Gwynne and Pat Lowe.

Emergence of Aboriginal authors in the 1960s was crucial in breaking the clichéd formula of representing Aboriginal culture. The first children's book under Aboriginal authorship was a picture book, The Legends of Moonie Jarl (1964), by Wilf Reeves and Olga Miller. Oodgeroo's Stradbroke Deamtime (1972) and The Rainbow Serpent (1975), Dick Roughsey's The Giant Devil-Dingo (1973) were the next to follow. All these works suffered in the hands of major publishing houses since they tried to modify the indigenousness of these works to cater to the need of the non-indigenous readers who were at that time the main consumers of all sorts of indigenous art. It was not until Indigenous publishing houses like Magbala Books and IAD Press came into being that the establishment of culturally different literature was uncompromisingly produced. The role of Aboriginal Arts Board was crucial in the publication of one of the landmark works in Aboriginal children's literature, The Aboriginal Children's History of Australia (1977). The then chairman of AAB, Wandjuk Marika, wished to awaken "Aboriginal children ... to an awareness of ... identity and pride in their past" by incorporating "written and painted contributions from Aboriginal children from forty-nine schools around Australia" (Toorn 40). Daisey Utemorrah and Pat Torres's Do Not Go Around the Edges (1990) freely employs Aboriginal narrative strategies in a most striking way to destroy stereotyped White narrative modes:

> Utemorrah's autobiographical story is placed along the bottom of the pages, while her poems are placed in the body of each page, framed within Pat Torres' illustrations. The border that runs along the lower edge of each page features the

[1] This expression was originally used by John Stephens and Robyn McCallum to describe the European influences that inform the construction of mythological, legendary or fairy tales (Stephens and McCullam 6-9).

> three sacred beings known in Wunambal culture as Wandjinas, orienting the various narrative and thematic strands of the book in relation to the ancient stories of the Dreaming. Relationships between these strands are elusive, as most of the poems in the book connect only tangentially with Utemorrah's autobiographical story. Readers accustomed to the reading practices usual in Western picture books will search in vain for thematic and symbolic interactions between verbal and visual texts, and this very complexity disrupts any simplistic notion that Do Not Go Around the Edges can be read as a mixture or blending of elements from different cultures. Rather, its multiplicity of narratives and systems of meaning destabilises the domination of British culture and standard English. (Bradford, "Australian Children's Literature" 298-9)

Lionel Forgarty's Booyooburra (1993) is full of colloquialised Aboriginal English and Aboriginal artist Sharon Hodgson's illustrations to represent the author's inclination towards oral culture. Aboriginal artist Bronwyn Bancroft enriched children's books by illustrating celebrated works like Oodgeroo's Stradbroke Dreamtime and Sally Morgan's Dan's Grandpa with illustrations that make Aboriginal culture come alive. My Girragundji (1998), Maybe Tommorrow (1998) and The Binna Binna Man (1999) by Meme McDonald and Boori Pryor are examples of collaborative works of Aboriginal and White authors. They successfully locate their stories in Aboriginal cultural domain and often employ non-European narrative and discursive traditions.

As an author of children's literature, Jack Davis incorporates different facets of Aboriginality, like oral traditions, language, song, music, dance and other cultural elements to inculcate the ideological system of Aboriginality into young readers and audiences. Though he was writing his plays in the 1980s, when Aboriginal readership grew to a considerable number, he meant his plays primarily to be staged than to be published between the covers to exploit the added advantage of this literary form to directly re-present his culture through the performances. Along with the growth of Aboriginal readership and publication units, the 1980s is also notable for being the initial stage of multicultural Australia and the decade of Aboriginal protests against the bicentennial celebrations of White settlement in Australia. As a children's author, Davis takes effort in solving the racial conflict in his children's plays to reach a harmonious state at the ends of the plays. The readings of the children's plays reveals that, unlike other plays of Davis, his children's plays promote Aboriginality without reiterating the issue of wronged past that preoccupies his all other plays. The fact that his firebrand re-appropriational stance as an Aboriginal playwright is replaced with a reconciliatory approach in these plays indicates Davis's success as an author for children.

On the other hand Davis's representations of childhood in his adult plays portray childhood under the corruptive influence of the White culture and even the Aboriginal adults inside the families. In these plays Davis is uncompromisingly realistic in his

portrayal of the issues related to Aboriginal politics. Hence, the children characters here suffer a premature contamination of the evils and maturity of the adult world.

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ORIGINAL ARTICLE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in nonideal classical plasmas

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Abstract

Effects of nonideality of classical plasma on the reaction: $p + H(1s) \rightarrow H(nlm) + p$ has been investigated by carrying out fully quantum mechanical calculations within the framework of a first-order distorted wave method. Scattering amplitude is calculated conveniently by employing a simple, variationally determined wave function of hydrogen atom embedded in nonideal classical plasma. A detailed study is made on the changes in electron transfer cross sections due to the nonideality of plasma varying from 0 to 4 and the incident proton energy lying between 10 and 500 keV. It has been found that nonideality of plasma causes substantial change in capture cross section.

KEYWORDS

charge transfer, distorted wave method, non-ideal plasma, proton-hydrogen collision, pseudopotential

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a paradigm of charge (electron) transfer during collisions. Studies on such scattering process provide us with several important information regarding mechanism of charge transfer processes. Moreover, the scattering of proton from hydrogen atom takes place naturally in various astrophysical environments.[1–9] As a result, various properties of the embedding environment are characterized by such scattering. Data of various scattering cross sections (CSs) are of frequent use in plasma diagnostics and interpretation of various astrophysical phenomena.[8,9] For instance, scattering CSs are used to calculate the profiles and intensities of emission (absorption) lines produced by hydrogen atom.[9] This scattering model has also an impact on fusion research.[10]

Over past few decades, the scattering of proton from hydrogen atom has been investigated quite elaborately[10–34] (and further references therein) by applying various techniques. Particular emphasis was given to obtain cross sectional data quite accurately for low to lower incident proton energies. In most of the reported studies, investigations were made in vacuum, that is interactions among protons and electron were considered to be pure Coulombic in nature.

In this work, we make an attempt to study the scattering process,

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in nonideal classical plasmas (NCP). Nonideality of plasma is characterized by the nonideality parameter γ which is defined as the ratio of mean potential energy to the mean kinetic energy of the thermal motion of the plasma particles.

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Contribution of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through OpenDOAR as on: 01.10.2020

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Contribution of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through OpenDOAR as on: 01.10.2020

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ABSTRACT

This paper study open access repositories in the contribution of BIMSTEC country through OpenDOAR to demonstrate country wise no of repositories, ccategory wise, language wise, software wise, subject wise, software wise, content wise distribution of these repositories. These BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country which is include Bhutan, India, Myanmar, Sri Lanka, Thailand, Bangladesh, Nepal. This paper includes only one conceptual part – i) analysis of these countries through OpenDOAR set a parameter like software in use, country of origin, language wise distribution, document types etc.; and ii) growth of these countries using these OpenDOAR. Here, OAI/PMH compliant are not using OA repositories system. At present it shows country wise distribution, language wise distribution, software wise distribution, subject wise distribution etc. perspective study for this system. It will be helpful throughout the all over world to spreading free access knowledge.

Keywords: OA Archives, Green Open Access, OpenDOAR, Open Access Repositories, Institutional Repositories

Introduction: BASE -an exclusive search engine for Open Access (OA) scholarly materials recently reports coverage of 82 million OA resources (as on March 31, 2015), DOAJ now covers 10,500+ OA journals, OpenDOAR and ROAR provides listing of more that 3,500+ OA repositories (as on March 31, 2015). These facts and figures indicate that a movement, the growth of OA repositories helps users to find out OA version of journal papers that are otherwise available through commercial channels. But at the same time the exponential growth of OA in distributed manner creates problems in OA retrieval (Sarkar & Mukhopadhyay, 2010).

Open DOAR is an authoritative directory of academic open access repositories. Each Open DOAR repository is visited by project staff to check the information that is provided by the repositories. This in-depth approach does not work-on automated analysis and gives a controlled list of repositories after human evaluation (Wikipedia, 2015).

OpenDOAR provides simple repository list, search for repository or search repository contents. The content search interface of OpenDOAR is supported Google Custom Search Engine (CSE) and thereby ensures the power search features of the search leader of the world. The search repository provides tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure. Institutional repositories are one of the recommended ways to achieve the open access vision

described in the Budapest Open Access Initiative definition of open access. This is sometimes referred to as the self-archiving or 'green' route to open access (Wikipedia, 2017). Presently, it covers around 3200+ OA repositories with detail information on each of the listed repositories.

This paper is an attempt to analyze current status of OA repositories on BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR propose a model for integration of all OAI/PMH compliant repositories in the domain for end users. BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country are included these countries.

1.Bangladesh
2.Bhutan
3.India
4.Myanmar
5.Nepal
6.Sri Lanka
7.Thailand

Objectives:

In this era, Open DOAR repositories are spreading knowledge day-by-day all over world. As on date OpenDOAR analysis BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country (data as on October 1st, 2020 reported in OpenDOAR). But OpenDOAR is not the only tool in the domain. There are two major tools to identify OA repositories which are OpenDOAR (Directory of Open Access Repositories), ROAR (Registry of Open Access Repository) etc. There are overlaps in these directory services but as OpenDOAR is more comprehensive, this article depends on the datasets as given in OpenDOAR. Analysis all perspective of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country.

The objectives of this study are to diagnose:

- To develop a state-of-the-art report/dataset on open access (particularly Green path) in the particular domain of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country.
- To study OA repositories on BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country through explain different generic parameters.

1. These are, country wise distribution,
2. Category wise distribution,
3. Language wise distribution,
4. Software wise distribution,
5. Subject wise distribution,
6. Content wise distribution
7. Growth of OpenDOAR (BIMSTEC country) etc and so on.

Discussion and analysis all criteria of BIMSTEC country (as on: 01.10.2020):

No. of Repositories

It is interesting to note that the total no of repositories 150 (100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories', and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Table 1: No of Open Access Repositories: Country wise distribution

Sl.No	Country	No of Repositories	Percentage
1	**Bangladesh**	14	9.33
2	**Bhutan**	0	0
3	**India**	100	66.66
4	**Myanmar**	2	1.33
5	**Nepal**	1	0.66
6	**Sri Lanka**	16	10.66
7	**Thailand**	17	11.33
	Total	150	100

Table 1: Country wise distribution through OpenDOAR

Table 1 is based on the number of repositories are distributed country wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Country wise distribution showing in bar chart which is given below:

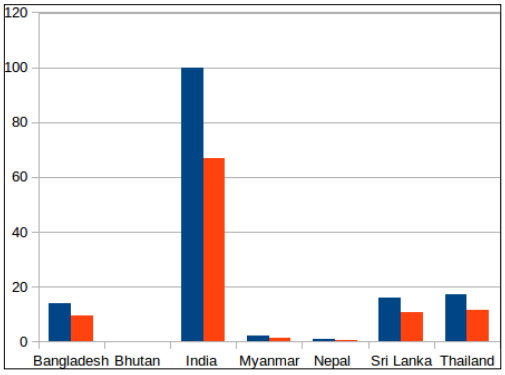


Fig. 1: Distribution of LIS OA Journals by country wise showing in column diagram.

Table 2: Open Access Repositories: Category wise ddistribution

It is interesting to note that the total no of repositories 145(100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories', and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Sl.No	Country	Institutional	Disciplinary	Governmental	Aggregating	Total
1	Bangladesh	13	1	1	0	15
2	Bhutan	0	0	0	0	0
3	India	81	10	1	5	97
4	Myanmar	2	0	1	0	2
5	Nepal	0	1	0	0	1
6	Sri Lanka	16	0	0	0	16
7	Thailand	12	1	1	0	14
	Total Repository	124	13	4	5	145
	Percentage	85.51	8.96	2.75	3.44	100

Table 2: Category wise distribution through OpenDOAR

Table 2 is based on the number of repositories are distributed country wise of OA compatible repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Country wise distribution showing in bar chart which is given below:

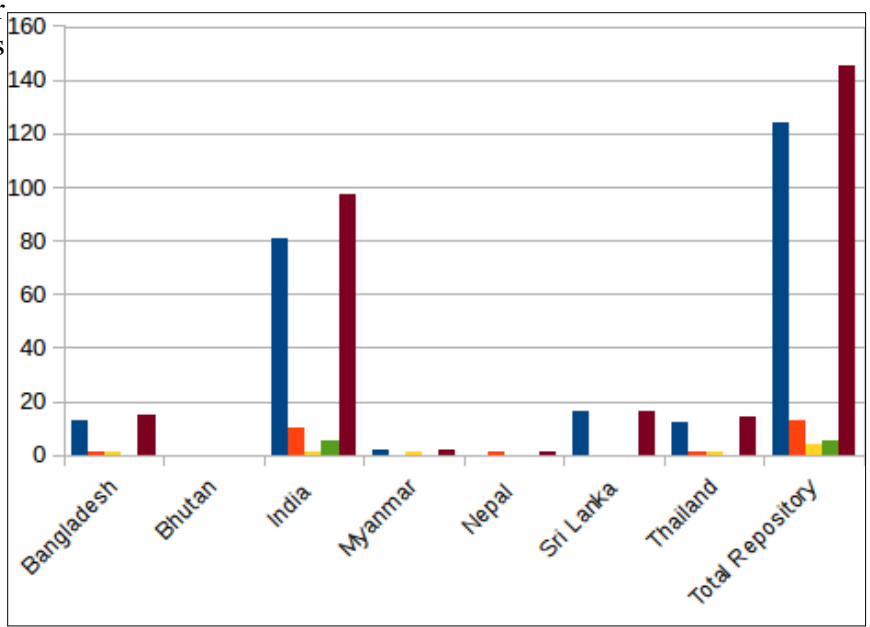


Fig. 2: Distribution of LIS OA Journals by country wise showing in column diagram.

Table 3: Open Access Repositories: Language wise distribution

As expected, the total no of repositories is 180(100%). In these repositories total English language are used 134 in BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. But in India 92 English language are used. It is highest rate of language all over world. After that, the second position of Thai language is total 14. Total Hindi Language are used 9 and it is only used in India. And the lowest number of languages is Arabic, Persian (Farsi), Sanskrit, Kannada language.

Sl.No	Country	English	Hindi	Bengali	Marathi	Malayalam	Gujrati	Arabic	Persian(Farsi)	Sanskrit	Kannada	Tamil	Thai	Sinhalese	Total
1	**Bangladesh**	14	0	3	0	0	0	0	0	0	0	0	0	0	17
2	**Bhutan**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	**India**	92	9	1	2	2	3	1	1	1	1	0	0	0	113
4	**Myanmar**	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5	**Nepal**	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6	**Sri Lanka**	14	0	0	0	0	0	1	0	0	0	2	0	5	22
7	**Thailand**	11	0	0	0	0	0	0	0	0	0	0	14	0	25
	Total Repository	134	9	4	2	2	3	1	1	1	1	2	14	5	180
	Percentage	74.44	5	2.22	1.11	1.11	1.66	0.55	0.55	0.55	0.55	1.11	7.77	2.77	100

Table 3: No of Language wise distribution of OAI compatible repositories (Green path)

Table 4 is based on the number of repositories are distributed in language wise of OAI compatible repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Language wise distribution showing in bar chart which is given below:

Fig. 3 : Distribution of LIS OA repositories by Language wise showing in bar diagram

Table 4: Open Access Repositories: Software wise Distribution

As reported earlier discussion, DSpace is the most popular open-source software. In BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories DSpace software is used 93 (69.92%). In India 34 Dspace software are used in different repositories all over India. But in India EPrints used 41 repositories. This is largest number of repositories, EPrints is used in repositories which is (30.82%). After that, Greenstone 5(3.75%), Drupal 1(0.75%), Others 8(6.01%) software are used in repositories.

No. of Country		**Name of Software**					
		DSpace	**Eprints**	**Greenstone**	**Drupal**	**Others**	**Total**
	Bangladesh	13	0	2	0	0	15
	Bhutan	0	0	0	0	0	0
	India	34	41	1	1	5	82
	Myanmar	2	0	0	0	1	3
	Nepal	0	0	0	0	0	0

	Sri Lanka	15	0	0	0	1	16
	Thailand	16	0	0	0	1	17
	Total Software	93	41	5	1	8	133
	Percentage	69.92	30.82	3.75	0.75	6.01	100

Table 4 : No of Software wise distribution of OAI compatible repositories(Green path)

Table 4 is based on the number of repositories are distributed in Software wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Software name wise distribution showing in bar chart which is given below:

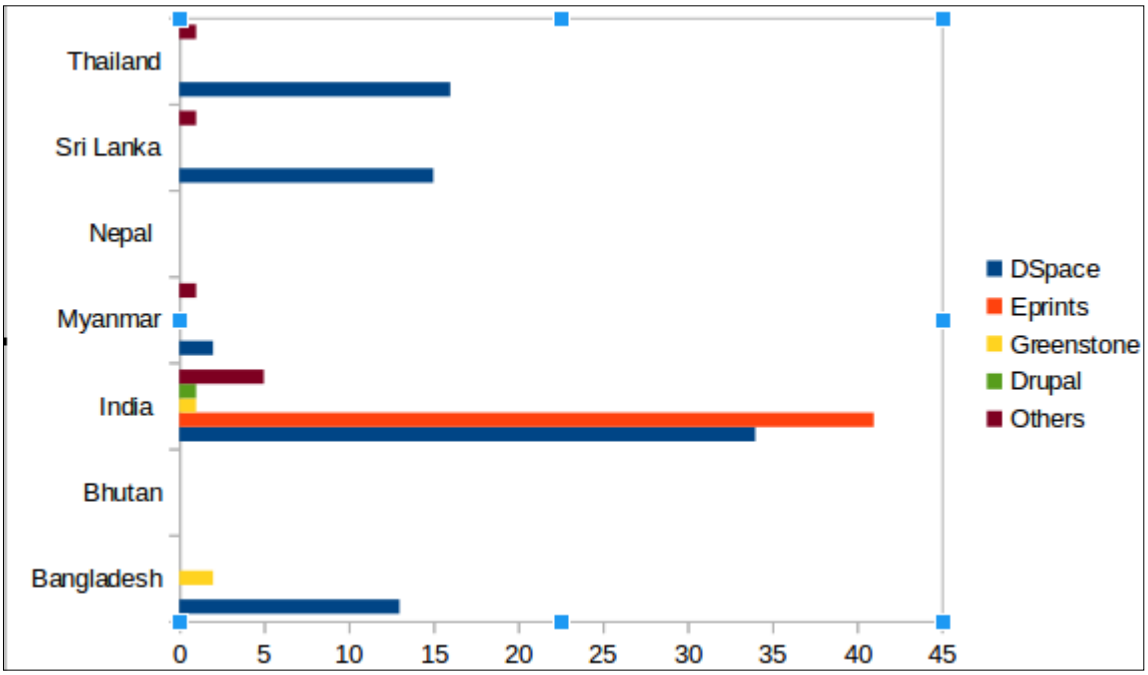


Fig. 4: Distribution of LIS OA repositories by Software wise showing in bar chart

Table 5: Open Access Repositories: Subject wise distribution

It is interesting to note that the total no of repositories 145(100%). Bangladesh contains 14(9.33%) repositories. Bhutan lies 0 repositories, and the percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Subjects	Nepal	Thailand	India	Sri Lanka	Bangladesh	Bhutan	Myanmar	Total
Agriculture, Food and Veterinary	1	2	9	4	2	0	0	18
Multidisciplinary	1	10	41	8	10	0	2	72
Business & Economic	0	0	2	1	3	0	0	6
Computer & IT	0	0	6	1	1	0	0	8
Arts & Humanities General	0	0	2	2	1	0	0	5
Language & Literature	0	0	1	0	1	0	0	2
Library and Information Science	0	0	6	0	2	0	0	8
Technology General	0	0	11	0	0	0	0	11
Architecture	0	0	1	0	0	0	0	1
Electrical & Electronic Engg	0	0	5	0	2	0	0	7
Social Science General	0	1	3	0	0	0	0	3
Eduction	1	1	1	0	0	0	1	4
Law & Politics	1	0	1	0	2	0	0	4
Management & Planning	0	0	2	0	2	0	0	4
Mechanical Engg & Materials	0	0	3	0	1	0	0	4
Ecology & Environment	0	1	5	2	0	0	0	8
Earth & Planetary Science	0	0	3	0	0	0	0	3
Civil Engg	0	0	5	0	1	0	0	6
Psychology	0	0	1	0	0	0	0	1
Geography & regional Studies	0	0	0	0	0	0	0	0
History & Archeology	0	0	0	1	1	0	0	2
Philosophy & Region	1	1	0	1	0	0	0	3
Biology & Bio-Chemesrty	0	0	9	0	1	0	0	10
Math & Statistics	0	0	4	0	0	0	0	4

Chemistry & Chemical Technology	0	0	11	0	0	0	0	11
Physics & Astronomy	0	0	7	0	0	0	0	7
Mechanical Engg & Materials	0	0	3	0	0	0	0	3
Health & Medicine	**0**	2	11	0	2	0	0	13
Science General	0	0	9	1	0	0	0	10
Total Subject	5	18	162	21	32	0	3	241
Percentage	2.07	7.46	67.21	8.71	13.27	0	1.24	100

Table 5: Subject wise distribution in Open Access repositories

Table 5 is based on the number of repositories are distributed in Software wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Software name wise distribution showing in bar chart which is given below:

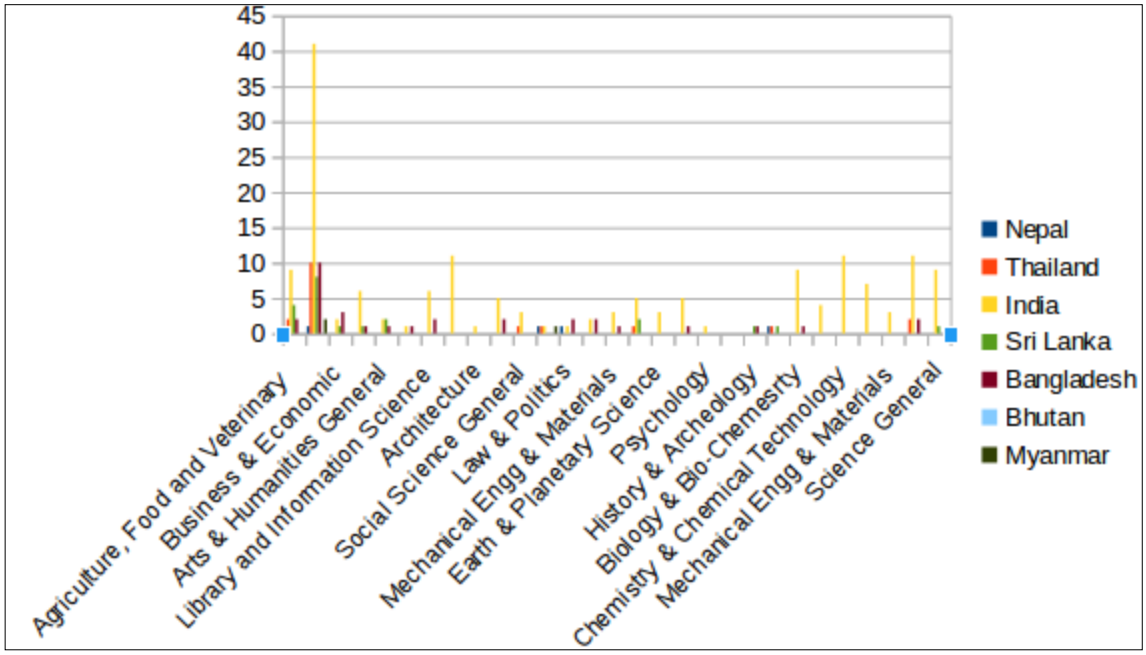


Fig. 7 : Distribution of LIS OA repositories by Software wise showing in column chart

Table 6: Open Access Repositories: Content wise distribution

It is interesting to note that the total no of repositories 465(100%) in BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Bangladesh contains 47(10.10%) repositories. Bhutan lies 0 repositories, and the

percentage is also 0 %. India contains 100(66.66%) repositories. India contains 100(66.66%) repositories. Myanmar contain 2(1.33%). Nepal contains 1(0.66%), Sri Lanka contain 16(10.66%) and Thailand contain 17(11.33%). The largest number of repositories are from India100(66.66%) and the lowest is Nepal 1(0.66%). in Bhutan there is no repositories present.

Subject	**Nepal**	**Thailand**	**India**	**Sri Lanka**	**Banglades h**	**Bhutan**	**Myanmar**	**Total**
Books and Chapters and Sections	0	8	35	11	4	0	0	58
Journal Articles	0	13	70	13	10	0	3	109
Dataset	0	0	3	0	0	0	0	3
Learning Objects	0	3	19	2	2	0	0	26
Multimedia	0	0	0	0	0	0	0	0
Patents	0	0	6	0	0	0	0	6
Special	0	0	0	0	0	0	0	0
Theses and Dissertation	0	9	52	8	10	0	2	81
Unpublished	0	0	0	0	0	0	0	0
Bibliographic References	0	4	14	3	1	0	0	22
Reports and Working Papers	0	9	28	5	9	0	0	51
Other Special item types	1	8	31	0	6	0	0	45
Conference and Workshop Papers	0	9	47	7	5	0	0	68
Total Subject Repository	1	63	305	49	47	0	5	465
Percentage	0.21	13.54	65.59	10.53	10.10	0	1.07	100

Table 5: Subject wise distribution in Open Access repositories

Table 5 is based on the number of repositories are distributed in Software name wise repositories of BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories. Content wise distribution showing in column chart which is given below:

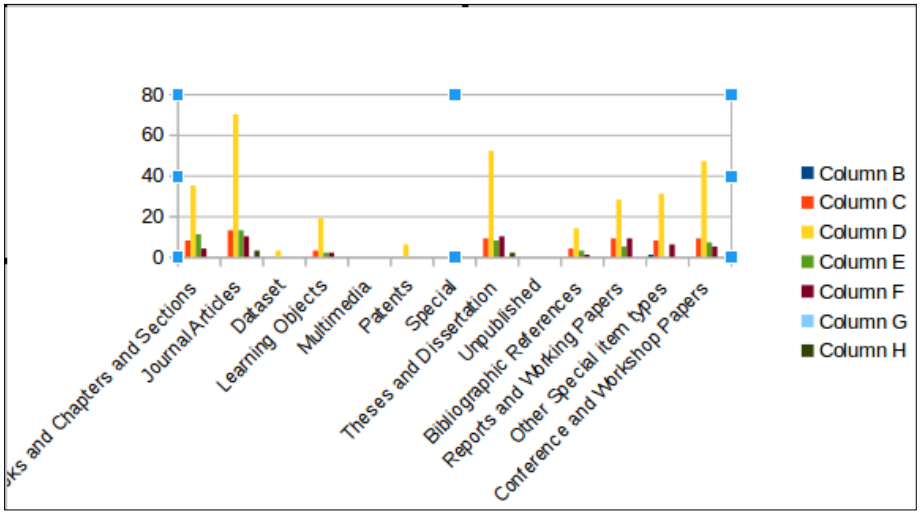
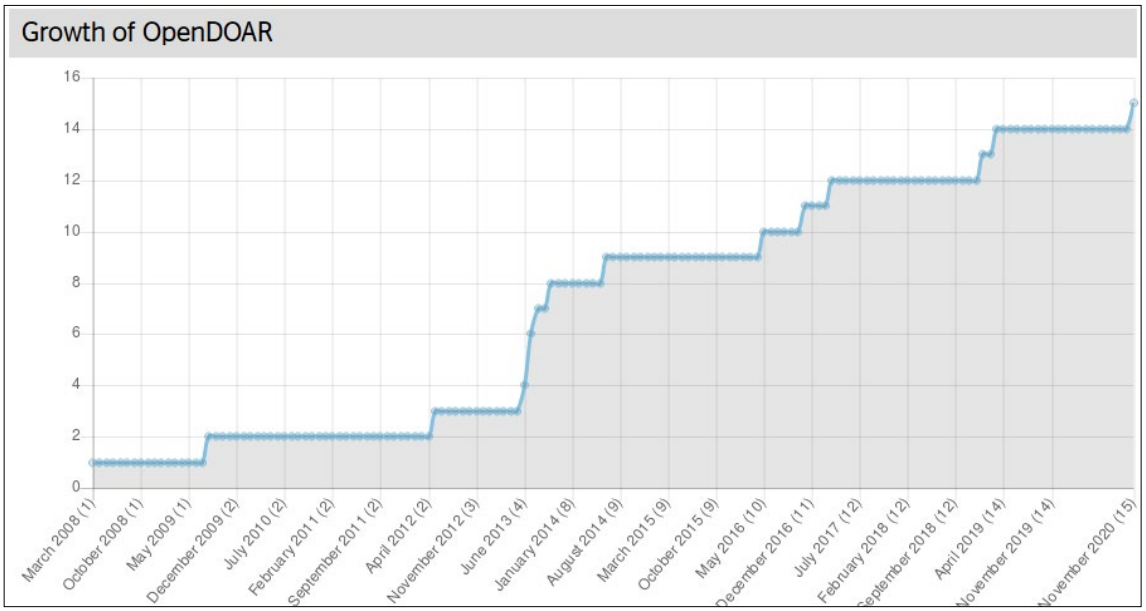


Fig. 5 : Distribution of LIS OA repositories by Software wise showing in coloum chart

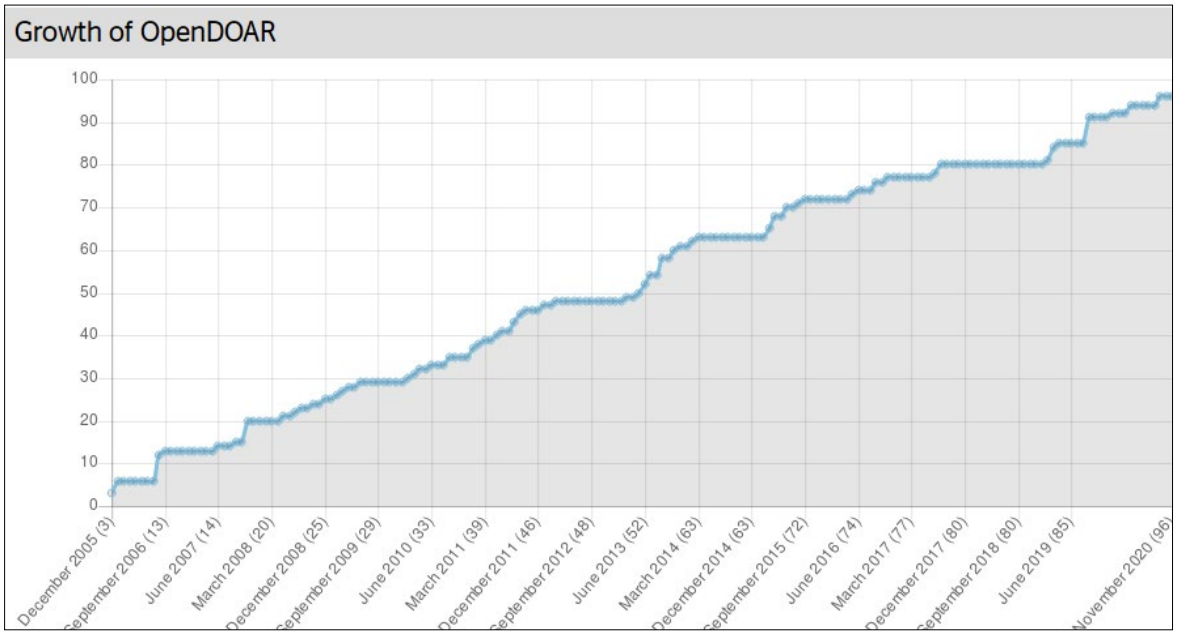
Table 7: Growth of OpenDOAR

Bangladesh showing growth of OpenDOAR.



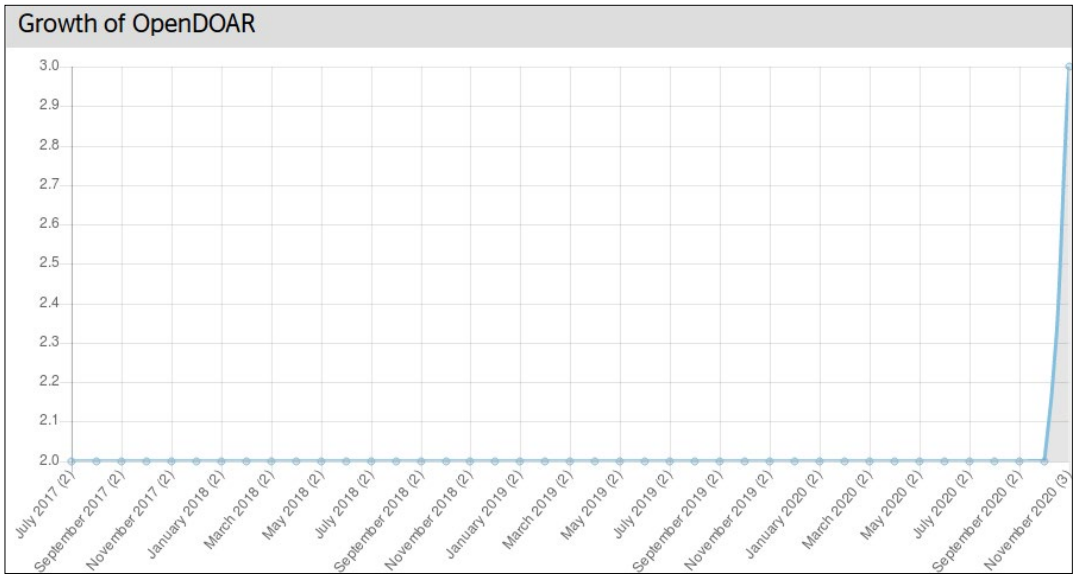
In 2008 Bangladesh contain 1 repository and after long time the growth of OpenDOAR repositories is now 15, as on 01.10.2020.

India showing growth of OpenDOAR.



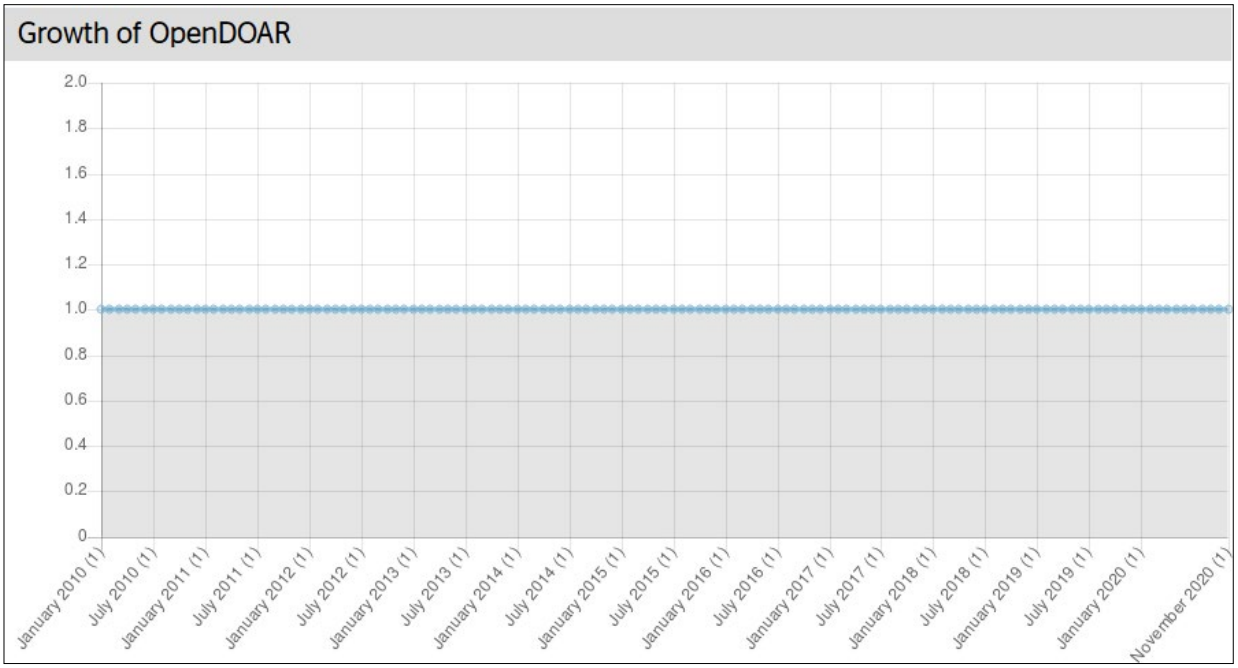
In 2005 India contain 3 repositories and after long time the growth of OpenDOAR repositories is now 100, as on 01.10.2020. That is highest repository continent in the BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country in OpenDOAR OA Repositories

Myanmar showing growth of OpenDOAR



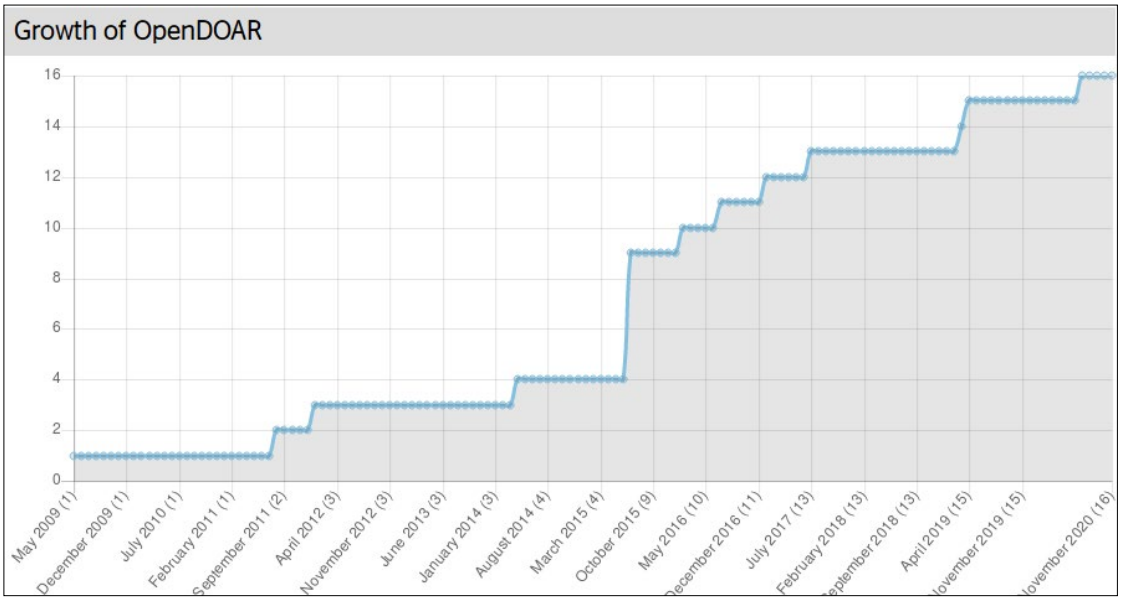
In 2017 Myanmar contain 2 repositories and after long time the growth of OpenDOAR repositories is now 3 in, as on 01.10.2020.

Nepal showing growth of OpenDOAR.



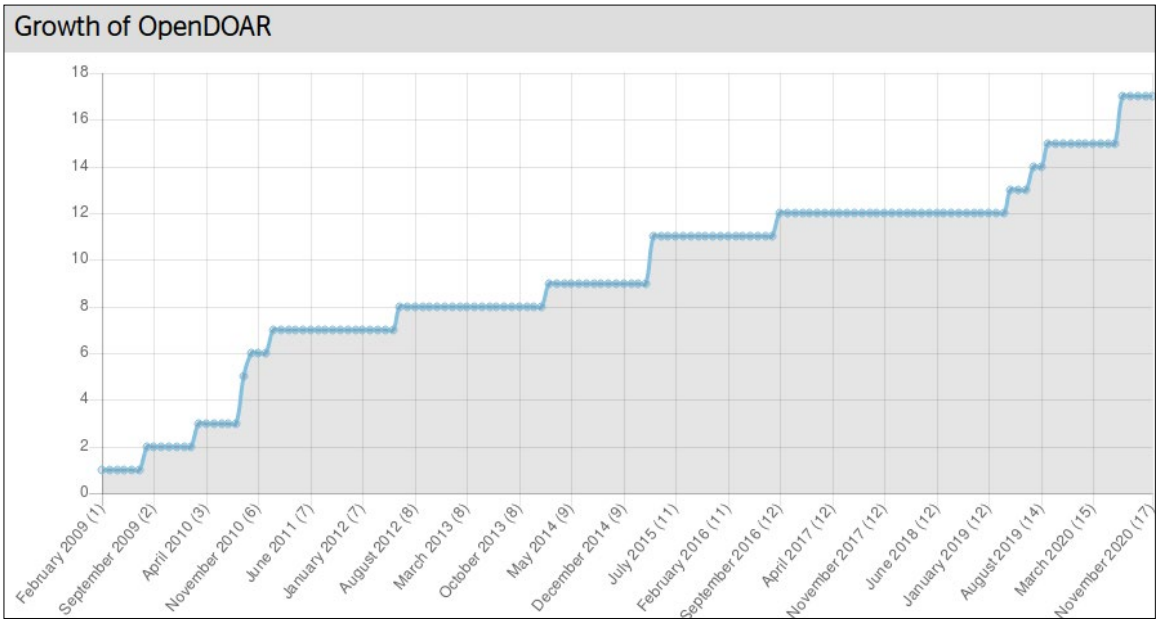
In 2010 Bhutan contain 1 repository and after long time the growth of OpenDOAR repositories is now 1 in, as on 01.10.2020. The number of repositories is not changeable.

Sri Lanka showing growth of OpenDOAR.



In 2009 Sri Lanka contain 1 repository and after long time the growth of OpenDOAR repositories is now 16, as on 01.10.2020.

Thailand showing growth of OpenDOAR



In 2009 Thailand contain 1 repository and after long time the growth of OpenDOAR repositories is now 17, as on 01.10.2020. The huge growth rate is shown in this country.

Conclusion: Currently, Open Access is playing a big function to pave the path of an alternative scholarly communication system in place of or in addition to the traditional value based scholarly communication process. In BIMSTEC (Bay of Bengal Initiative for Multi-Sectional Technical Economic Co-operation) country, India has largest no of repositories through Open DOAR. Total number of repositories is 100 in India. In Bhutan there is no repositories till date. The Green Open Access repositories are used research in public domain freely and instantly is becoming a reality day-by-day. This paper demonstrates the possibility in contain of BIMSTEC countries. It shows the global trend of opening research results speedily. Category wise institutional repositories are high in number and governmental repositories are low in number. Most of the English language are used in repositories. DSpace software are used in most of the repositories. Subject wise multidisciplinary content are used in repositories. Content wise journal article are used in these repositories. Bhutan has no any other repositories to spread high quality of knowledge.

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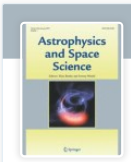

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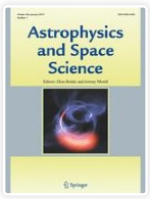

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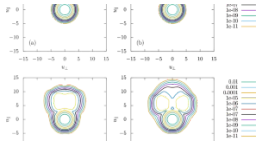

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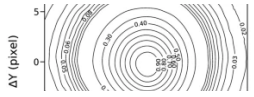

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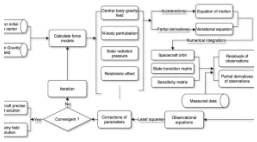

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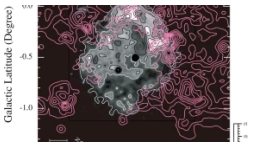

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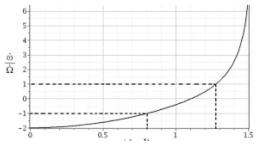

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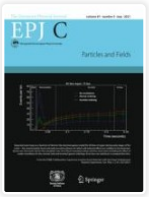

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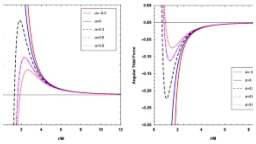

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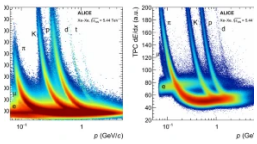

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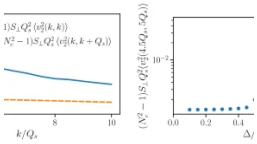

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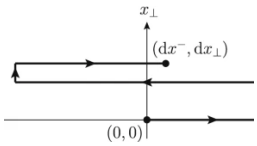

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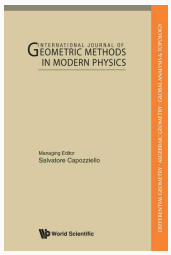

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ORIGINAL ARTICLE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in nonideal classical plasmas

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Abstract

Effects of nonideality of classical plasma on the reaction: $p + H(1s) \rightarrow H(nlm) + p$ has been investigated by carrying out fully quantum mechanical calculations within the framework of a first-order distorted wave method. Scattering amplitude is calculated conveniently by employing a simple, variationally determined wave function of hydrogen atom embedded in nonideal classical plasma. A detailed study is made on the changes in electron transfer cross sections due to the nonideality of plasma varying from 0 to 4 and the incident proton energy lying between 10 and 500 keV. It has been found that nonideality of plasma causes substantial change in capture cross section.

KEYWORDS

charge transfer, distorted wave method, non-ideal plasma, proton-hydrogen collision, pseudopotential

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a paradigm of charge (electron) transfer during collisions. Studies on such scattering process provide us with several important information regarding mechanism of charge transfer processes. Moreover, the scattering of proton from hydrogen atom takes place naturally in various astrophysical environments.[1–9] As a result, various properties of the embedding environment are characterized by such scattering. Data of various scattering cross sections (CSs) are of frequent use in plasma diagnostics and interpretation of various astrophysical phenomena.[8,9] For instance, scattering CSs are used to calculate the profiles and intensities of emission (absorption) lines produced by hydrogen atom.[9] This scattering model has also an impact on fusion research.[10]

Over past few decades, the scattering of proton from hydrogen atom has been investigated quite elaborately[10–34] (and further references therein) by applying various techniques. Particular emphasis was given to obtain cross sectional data quite accurately for low to lower incident proton energies. In most of the reported studies, investigations were made in vacuum, that is interactions among protons and electron were considered to be pure Coulombic in nature.

In this work, we make an attempt to study the scattering process,

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in nonideal classical plasmas (NCP). Nonideality of plasma is characterized by the nonideality parameter γ which is defined as the ratio of mean potential energy to the mean kinetic energy of the thermal motion of the plasma particles.

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EDITOR'S CHOICE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in dense semi-classical hydrogen plasma

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Abstract

Quantum mechanical calculations have been accomplished to study the dynamics of the reaction: $p + H(1s) \rightarrow H(nlm) + p$ in dense semi-classical hydrogen plasma. Interactions among the charged particles in plasma are represented by a pseudopotential which takes care of the collective effects at large distances and quantum effect of diffraction at small distances. Various capture cross sections are computed for the incident proton energy lying within 10 to 500 keV by applying a distorted wave method which uses a variationally determined closed-form wave function of hydrogen atom. Moreover, an inclusive study is made to explore the effects of screening of plasma and quantum diffraction on various capture cross sections for a wide range of thermal Debye length and de Broglie wave length. It has been found that various cross sections suffer considerable changes due to varying Debye length and de Broglie wave length.

KEYWORDS

charge transfer, distorted wave method, proton-hydrogen collision, pseudopotential, semi-classical hydrogen plasma

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a common process that use to take place naturally in almost every astrophysical environment because of the abundant presence of atomic hydrogen in those environments.[1,2] Consequently, different kinds of important properties of the embedding environment are substantially regulated by this scattering process. Explanation of numerous phenomena associated with the embedding medium often requires the results of various cross sections (CS) of that process.[3,4] For example, explanation of profile and line intensities of absorption or emission of hydrogen atom requires the results of CSs.[4] As a matter of fact, a typical example of ion-atom scattering is the scattering of proton from hydrogen atom in which, depending on the energy, elastic, excitation, ionization, and rearrangement processes are possible to take place. Performing sophisticated quantum mechanical calculations on rearrangement scattering (also called electron or charge transfer process) is a challenging task, and thus the process has attracted the fancy of researchers[5–31] ever since the work of Oppenheimer in vacuum.[5] In plasma environments, reported investigations are relatively small.[20–22] Of late, the authors have investigated the following electron transfer process[22]:

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in classical non-ideal plasmas by using a distorted wave method.[9] It was found that collision dynamics of the above process suffered considerable changes due to varying non-ideality of the plasma.

In this paper, we focus our attention on the above mentioned electron transfer process in dense semi-classical partially ionized hydrogen plasma. Degree of denseness is important in determining the behaviours of plasma at short distances

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ORIGINAL ARTICLE

Charged strange star in $f(R, T)$ gravity with linear equation of state

Pramit Rej[1] · **Piyali Bhar**[2]

Received: 30 November 2020 / Accepted: 27 March 2021

Abstract Our present study involves the strange stars model in the framework of $f(R, T)$ theory of gravitation. We have taken a linear function of the Ricci scalar R and the trace T of the stress-energy tensor $T_{\mu\nu}$ for the expression of $f(R, T)$, i.e., $f(R, T) = R + 2\gamma T$ to obtain the proposed model, where γ is a coupling constant. Moreover, to solve the hydrostatic equilibrium equations, we consider a linear equation of state between the radial pressure p_r and matter density ρ as $p_r = \alpha\rho - \beta$, where α and β are some positive constants, Both α, β depend on coupling constant γ which have been also depicted in this paper. By employing the Krori-Barua *ansatz* already reported in the literature (J. Phys. A, Math. Gen. 8:508, 1975) we have found the solutions of the field equations in $f(R, T)$ gravity. The effect of coupling constant γ have been studied on the model parameters like density, pressures, anisotropic factor, compactness, surface redshift, etc. both numerically and graphically. A suitable range for γ is also obtained. The physical acceptability and stability of the stellar system have been tested by different physical tests, e.g., the causality condition, Herrera cracking concept, relativistic adiabatic index, energy conditions, etc. One can regain the solutions in Einstein gravity when $\gamma \to 0$.

Keywords General relativity · Compact star · $f(R, T)$ gravity · Causality condition

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1 Introduction

Recently, the LIGO/Virgo Collaboration announced the observation of a merger of a black hole with mass $23.2^{+1.1}_{-1.0}\ M_\odot$ with a compact object with mass $2.59^{+0.08}_{-0.09}\ M_\odot$ (Abbott et al. 2020), where the mass of the secondary component lies within the so-called low mass gap (Bailyn et al. 1998; Özel et al. 2010; Belczynski et al. 2012). Theoretical and observational evidence suggests that black holes of mass less than 5 $M_\odot$ may not be produced by stellar evolution (Özel et al. 2010; Belczynski et al. 2012; Farr et al. 2011). According to some candidate equations of state, a stable neutron star must have a mass of at most 3 $M_\odot$ (Müller and Serot 1996; Rhoades and Ruffini 1974; Özel et al. 2012; Kiziltan et al. 2013). If the mass exceeds this limit, it is hypothesized that neutrons lose their individuality under extreme pressure and breakdown into quarks. A quark star is smaller in size but ultra-dense as compared to the neutron star. However, increased pressure in its core stops quark stars from collapsing into black holes. Moreover, estimates of radii of some stellar objects (LMC X-4, 4U 1820-30, Her X-1, etc.) suggest that their structure and characteristics may be similar to that of strange quark stars. On the other hand, the relatively small tidal deformability measured in gravitational-wave signal GW170817 do not favor such large values of $M_{\max}$ but rather suggest it is of the order of 2.5 $M_\odot$ (Abbott et al. 2018, 2019). The heaviest neutron star observed to date has a mass of $2.01 \pm 0.04\ M_\odot$ (Antoniadis et al. 2013), and the existence of compact objects in the mass regime [2.5, 5] $M_\odot$ is highly uncertain.

From the pioneering work done by Ruderman (1972) it was already proposed that celestial bodies under certain conditions may become anisotropic. The author observed that relativistic particle interactions in a very dense nuclear matter medium could lead to the formation of anisotropies. In-

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Charged compact star in $f(R, T)$ gravity in Tolman–Kuchowicz spacetime

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Abstract In this current study, our main focus is on modeling the specific charged compact star SAX J 1808.4-3658 (M = 0.88 $M_{\odot}$, R = 8.9 km) within the framework of $f(R, T)$ modified gravity theory using the metric potentials proposed by Tolman–Kuchowicz (Tolman in Phys Rev 55:364, 1939; Kuchowicz in Acta Phys Pol 33:541, 1968) and the interior spacetime is matched to the exterior Reissner–Nordström line element at the surface of the star. Tolman–Kuchowicz metric potentials provide a singularity-free solution which satisfies the stability criteria. Here we have used the simplified phenomenological MIT bag model equation of state (EoS) to solve the Einstein–Maxwell field equations where the density profile (ρ) is related to the radial pressure (p_{r}) as $p_{\mathrm{r}}(r) = (\rho - 4B_{\mathrm{g}})/3$. Furthermore, to derive the values of the unknown constants a, b, B, C and the bag constant B_{g}, we match our interior spacetime to the exterior Reissner–Nordström line element at the surface of stellar system. In addition, to check the physical validity and stability of our suggested model we evaluate some important properties, such as effective energy density, effective pressures, radial and transverse sound velocities, relativistic adiabatic index, all energy conditions, compactness factor and surface redshift. It is depicted from our current study that all our derived results lie within the physically accepted regime which shows the viability of our present model in the context of $f(R, T)$ modified gravity.

1 Introduction

Einstein's General Relativity (GR) has continued to withstand the test of time in its predictions of physical phenomena within the realms of astrophysics and cosmology. From the classical predictions of the precession of Mercury's orbit and the deflection of starlight by a massive gravitating body to present day detection of gravitational waves and observations of black holes GR has triumphed. Early attempts seeking solutions of the Einstein field equations which describe stellar objects were crude and for most part unrealistic. The first exact solution of the Einstein field equations describing a self-gravitating sphere was obtained by Schwarzschild. The so-called interior Schwarzschild solution which described a constant density sphere suffered from various pathologies, the most notable being that the propagation speed for any signals within the fluid sphere was noncausal [1]. A survey of exact solutions appearing in the literature describing stellar objects by Delgaty and Lake [2] revealed that only a small subset of solutions meet the rigorous tests for physical viability, regularity and stability of fluid spheres.

The search for more realistic stellar models within GR required researchers to connect the macroscopic properties of stars determined through observations to the microphysics. A new era of stellar modeling was born, which went beyond the mathematical excursion of the Einstein field equations where ad hoc assumptions were made just to generate a toy model. Standard approaches which included assumptions on the metric function, density profiles, pressure profiles, anisotropy parameter and even the matter content which allowed for the system of equations to be integrated gave way to well-motivated techniques intrinsically connected to physics which include an equation of state (EoS), mass profiles linked to surface redshift and compactness of typical stellar structures. The linear EoS which links the radial pressure to the energy density has been generalized to include the microphysics (at least on a phenomenological level) via the so-called MIT bag model. The departure from pressure isotropy makes the modeling of stellar objects mathematically tractable. Imposing a barotropic EoS of the form $p_{\mathrm{r}} =$

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Charged gravastar model in $f(T)$ gravity admitting conformal motion

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In this paper, model of charged gravastar under $f(T)$ modified gravity is obtained. The model has been explored by taking the diagonal tetrad field of static spacetime together with electric charge. To solve the Einstein–Maxwell field equations, along with $f(T)$ gravity, we assume the existence of a conformal Killing vector which relates between geometry and matter through the Einstein–Maxwell field equations by an inheritance symmetry. We study several cases of interest to explore physically valid features of the solutions. Some physical properties of the model are discussed and we match our interior spacetime to the exterior Reissner–Nordström spacetime in presence of thin shell.

Keywords: General relativity; $f(T)$ gravity; gravastar; junction condition.

Mathematics Subject Classification 2020: 83C20, 83D05, 85A15

1. Introduction

In modern cosmology, one of the most important problems is to deal with the dark energy issue which causes the accelerating expansion of the Universe. This phenomenon has been confirmed by numerous observations of large scale structure [1,2] and measurements of the cosmic microwave background (CMB) anisotropy [3, 4]. The source that drives this cosmic acceleration is termed as 'dark energy' and it possesses positive energy density but negative pressure. It is well known that this form of energy acts as a repulsive gravitational force so that in General Relativity (GR) one needs to consider a further non-standard fluid with a negative pressure

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Relativistic compact stars in Tolman spacetime via an anisotropic approach

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Abstract In this present work, we have obtained a singularity-free spherically symmetric stellar model with anisotropic pressure in the background of Einstein's general theory of relativity. The Einstein's field equations have been solved by exploiting Tolman *ansatz* [Richard C Tolman, Phys. Rev. 55:364, 1939] in $(3+1)$-dimensional space-time. Using observed values of mass and radius of the compact star PSR J1903+327, we have calculated the numerical values of all the constants from the boundary conditions. All the physical characteristics of the proposed model have been discussed both analytically and graphically. The new exact solution satisfies all the physical criteria for a realistic compact star. The matter variables are regular and well behaved throughout the stellar structure. Constraints on model parameters have been obtained. All the energy conditions are verified with the help of graphical representation. The stability condition of the present model has been described through different testings.

1 Introduction

Stellar evolution predicts that when the nuclear fuel gets exhausted, the stars turn into highly dense compact objects such as white dwarf, neutron star or back hole. Massive stars undergoing the supernova explosion turn into neutron star and black hole. For neutron star, the main idea is that the gravitational collapse is supported by the neutron degeneracy pressure. The general perception is that for high densities at the core, nucleons have to converted to hyperons or either form condensates. Some studies predict that these nucleons could form Cooper pairs and can be in superfluid state. Based on the MIT bag model, Witten [1] provides the existence of strange quark matter, which indicates that the quarks inside the compact objects might not be in a confined hadronic state. At the high densities and pressures they could form a larger colorless region with equal part of up, down and strange quarks. Consequently, the composition of the core region of compact objects is still an open subject in relativistic astrophysics.

When densities of compact stars are greater than the nuclear matter density, it expects the appearance of unequal principal stresses, called anisotropic effect. This usually means that the radial pressure component p_r is not equal to the transverse component p_t. The presence of anisotropy was first predicted for self-gravitating objects in Newtonian regime by Jeans [2]. Later, Lemaitre [3] considered the local anisotropy effect in the context of general relativity and showed that the presence of anisotropy can change the upper limits on the maximum value of the surface gravitational potential. Ruderman [4] showed that a compact star with matter density ($\rho > 10^{15}$g cm^{-3}), where the nuclear interaction become relativistic in nature, is likely to be anisotropic. Herrera [5] presented the evidence on the appearance of local anisotropy in self gravitating systems in both Newtonian and general relativistic context. Since then, a lot of investigations have been carried out in finding new exact solutions with anisotropy feature.

For half of century, the theory of anisotropic compact stars in General Relativity has been developed. Bower and liang [6] provided the generalization of Tolman–Oppenheimer–Volkov equation in presence of anisotropy. The stability of a stellar model can be enhanced by a presence of a repulsive anisotropic force when $\Delta = p_t - p_r > 0$. This feature leads to more compact stable configurations compare to

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Finch–Skea star model in $f(R,T)$ theory of gravity

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This work discusses about the existence of compact star model in the context of $f(R,T)$ gravity with R as the Ricci scalar and T as the trace of energy–momentum tensor $T_{\mu\nu}$. The model has been developed by considering the spherically symmetric spacetime consisting of isotropic fluid with $f(R,T) = R + 2\beta T$ with β be the coupling parameter. The corresponding field equations are solved by choosing the well-known Finch–Skea *ansatz* [M. R. Finch and J. E. F. Skea, A realistic stellar model based on an ansatz of Duorah and Ray, *Class. Quantum Gravity* **6**(4) (1989) 467–476]. For spacetime continuity, we elaborate the boundary conditions by considering the exterior region as Schwarzschild metric. The unknown constants appearing in the solution are evaluated for the compact star PSR J 1614-2230 for different values of coupling constant. The physical properties of the model, e.g. matter density, pressure, stability, etc. have been discussed both analytically and graphically. This analysis showed that the geometry and matter are compatible with each other as well as the model is in stable equilibrium in the context of $f(R, T)$ modified gravity.

Keywords: Compact objects; $f(R,T)$ gravity; stability.

Mathematics Subject Classification 2020: 83C05, 83D05, 85A05, 85A15

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Spatio-Temporal Variations of Block Wise Rural Sex Ratio of Hooghly District in West Bengal (2001-2011)

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Abstract

Sex ratio is an important demographic index to access the social perception of the population of a region. It varies from one place to another and also changes from time to time depending on the socio economic progress of a region. The district of Hooghly located in the lower Ganga plane of West Bengal has a reach socio-cultural heritage as well as economic prosperity. However, the rural population in most part of the district are not so aware of the multiplications but still the imbalances are for more natural in occurrence. All these have been observed in the census year 2001 and 2011.

Keywords

Rural sex ratio; literate sex ratio; crude sex-ratio; worker sex-ratio; social perception.

Introduction

Demography is an indispensable part of geographical studies and sex ratio is one of the vital demographic attributes for any region. It affect the social, economic and political structure of a nation **(Saha and Debnath, 2016)**. Sex ratio is also an index of the socio-economic conditions prevailing in an area and is a useful tool for regional analysis **(Franklin, 1956)**. In Indian perspective sex ratio is measured in terms of number of females per thousand males. Since the two sexes play partly contrasting and partly complementary roles in the economy and society, the study of sex composition assumes added significance for a population geographer **(Chandna, 2007)**.So far the national scenario of the spatial distribution of sex ratio is concerned, it is found that the states of southern part of India have more than the national average while the northern and central part of the country are far behind from the national average**(Census, 2001 and 2011)**. As the northern states are highly populated so it can be realised that a huge portion area of total population of the country experiences a deficit sex ratio. The same trend continued during the last two census years 2001 and 2011.Reasons behind low female sex ratio in Indian scenario are gender discrimination (preference for son), discrimination against girl child, failure of stringent laws, MTP (abortion), female feticide

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Assessment of Agricultural Economy and Livelihood: A Case Study of Chandinagar Mouza, Hooghly District, West Bengal

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Abstract

Presently micro-level studies play a key role to measure the spatial differentiation as each space has its criterion that determines the differentiation. The study area is concentrated within mouza level. Chandinagar mouza is situated within Jangipara block in Hooghly district of West Bengal. Being a part of the rural area along with the vast agricultural field, agriculture is the livelihood of the people of the mouza. Most of the people are engaged in agricultural practices which is the driving force of the rural economy. The focus of the study is to find the interrelationship between the agrarian economy and the involvement of the people in it. Moreover, the feelings and mental attachment to agriculture are also taken into consideration.

Introduction

India is predominantly known for its riverine civilization since the ancient period. Over 60% of India's land area is arable making it the second-largest country in terms of total arable land (Goyel, 2016). Agriculture plays a vital role in India's economy. About 54.6% of the total population is engaged in agriculture and allied activities (Census 2011). Gross Value Added (GVA) at current prices for agriculture, forestry and fishing contributed 17.02% of national GVA in 2017-18 (MSPI, GOI, 2018-19). Contribution of agriculture, forestry and fishing in Indian economy is much higher than the world average of 3.4% in 2017 (World Bank, 2020).

In the beginning of the 21st Century, Indian farming shows a significant shift from traditional farming to modern commercial farming due to the availability and growth of infrastructural facilities like HYV seeds, chemical fertilizers, irrigation, pesticides, marketing, transport and Govt. extension programmes. Small and marginal farmers constitute a major portion of rural agricultural sector. So transformation of agriculture through modernization is positively related to sustainable livelihood of rural population (Mondal, Chakraborty and Mishra, 2017). The rural people in Indian scenario have traditionally accepted agriculture initially to fulfil the requirement of food for their families or to meet up the occupational demand, and thus, a bridge of affinity has been built between the farmer and soil. Agriculture in India is more a 'way of life' than a 'mode of business' (Goyel, 2016).

West Bengal is predominantly an agrarian State. Comprising of only 2.7% of India's geographical area, it supports nearly 8% of its population. There are 71.23 lakh farm families of whom 96% are small and marginal farmers. The average size of land holding is only 0.77 ha. However, the State is bestowed with diverse natural resources and varied agro-climatic conditions which support cultivation of a wide range of crops. The net cropped area is 52.05 lakh ha which comprises 68% of the geographical area and 92% of arable land. The cropping intensity is 184%. However, as the State is located in the humid tropic and the Bay of Bengal is close by, it has to often face vagaries of nature like flood, cyclone, hailstorm etc. Though the State has a surplus production of rice, vegetables and potato, a huge gap exists

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Basic Features and Strategies of Women's Empowerment of a Developing Urban Area – A Case Study of Memari Municipality, Purba Bardhaman, West Bengal, India

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ABSTRACT

Women's Empowerment is a holistic and sustainable goal for development of a society. They are the resources of family, society, community and nation. They are the greatest asset of an economy. Urbanization processes are not properly guided their roles in this society. Transformation of gender roles in urban contexts will require wider community involvement as well as administration. They are disadvantaged in income poverty, asset poverty, time and power. This paper is properly focused on features of empowerment of women in this society, their educational status, employment opportunities, social and economic status, as well as future strategies.

KEYWORDS: *Empowerment, Employment, Equality, Correlation, Census, Education, Workers*

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I. INTRODUCTION:

In a particular situation, offering power or authority to powerless is called empowerment. According to Kebber (2001), Empowerment is "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them. She explained that it is the process through which people's awareness, confidence, ability to solve problems, gaining access to resource and public facilities are increased. **The World Bank** defines empowerment as "the process of increasing the capacity of individuals or groups to make choice and transform those choices into desired actions and outcomes. Central to this process is actions which both build individual and collective assets and improve the efficiency and fairness of the organization and individual context which govern the use of these assets".

Generally, empowering of women is called women's empowerment. Women's empowerment is the process whereby women become able to organize themselves to increase their self reliance, to assert their independent rights to make choices and control resources which will assist in challenging and eliminating their own subordination. (Keller and Mbwewe, 1991 cited in Rowlands, 1995).The empowerment and autonomy of women and the improvement of their political, social, economic and health status is highly important end in itself. In addition, it is essential for the achievement of sustainable development [United Nations Population Fund (UNFPA), International Conference on Population and Development (ICPD), Power of Attorney (POA), Communications Audio Interface for Remote Operations (CAIRO), 1994]. . In UNDP Human Development Report, 1995, women's empowerment is the expansion of choices for women and an increase in the women's ability to exercise choices. Women must be considered as the agent of development rather than target of development agencies (R. India and Deepak Kumar Behra, 1999). According to Swami Vivekananda, "....there is no chance for the welfare of the world unless the condition of the women is improved. It is not possible for the bird to fly on one wing"(Yojana, August, 2001).Empowerment of women develops them as more aware individuals, who are politically active, economically productive and independent and are able to make intelligent decision in matters that affect them and their nations. (Lillikutty, 2003).

II. BACKGROUND OF THE STUDY:

According to working paper of **World Bank**, Alsop, et al (2005), empowerment is the enhancing of the individual's or group's capacity to make choices and transform those choices into desire actions and outcomes. In **Millennium**

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CLUSTER DEVELOPMENT PROGRAMME IN THE MSME SECTOR: EVIDENCE FROM WEST BENGAL

Dr. Rintu Nath*

Abstract

MSME sector is well-regarded as the backbone of the country's manufacturing output is facing a stiff competition from large scale manufacturers as well as MNCs. In such circumstances, CDP is an important platform and one of the finest schemes for the MSMEs. The key objectives of this scheme are to enhance productivity and capacity building of the MSMEs. Also, strengthen enterprises to combat internal challenges and external threats of the today's competitive business climate. The purpose of this study is to evaluate the impact of CDP on select MSME clusters in West Bengal, using 8 selected clusters across the state of West Bengal as case study. In order to understand the study aim, the entire study has divided into four sections. It starts with introduction; overview of CDP in the MSME sector in West Bengal is discussed in next section, followed by examination of the impact of CDP on select MSME clusters in West Bengal and finally, concludes the study. The study is based on case study of the eight selected clusters in West Bengal which already have received soft interventions of CDP. A qualitative research approach of the data collection is adopted using a questionnaire comprising of 4 questions relating to soft interventions. Based on this sample comprises of 399 respondents, the results obtained that CDP has a positive effect on MSMEs. The findings can prove useful to the MSME department and its policy makers, new entrepreneurs, researchers, as well as government and academic institutions.

Keywords: *MSME, interventions, clusters, academic*

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CDP ACTS AS DRIVING FORCE TO THE MSME SECTOR A CASE STUDY OF FAN CLUSTER IN WEST BENGAL

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Abstract

MSME sector well-regarded as the backbone of the country is facing with huge problems in connection with fund, technology, demand and efficiency. CDP acts as safeguard mechanism to the MSME sector which is generating second largest employment. The purpose of this study is to evaluate the effects of CDP on capacity building of the MSMEs, using electric fans industry in Kolkata, West Bengal as case study. Based on this sample, the results obtained indicate that CDP has a clear effect on the capacity building of the MSMEs. MSMEs have been immensely benefitted in terms of productivity and competitiveness from various capacity building measures. The findings can prove useful to MSME department and its policy makers, new entrepreneurs, researchers, as well as government and academic institutions.

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) are the growth accelerators and considered as the 'backbone of the Indian economy.' In spite of sizeable contribution to the economy, this sector is struggling for existence because of facing stiff competitions from large scale manufacturers as well as global corporations. In such circumstances, Cluster Development Programme (CDP) is an excellent platform and one of the finest schemes for the MSMEs in order to safeguard this sector properly. CDP acts as catalyst for channelizing the necessary resources in a social network towards enhancement of building confidence and competitiveness of this sector. The key objectives of CDP are to increase productivity and capacity building of the MSMEs. It also strengthens enterprises to combat internal challenges and to defeat global threats of the today's competitive business climate. CDP has its two successive interventions namely soft and hard interventions. CDP protects MSMEs through soft interventions or to build up soft skills development and hard interventions or to build up the common facility Centre (CFC).

The purpose of this study is to examine the effects of CDP on capacity building of the MSMEs, using electric fans cluster in Kolkata, West Bengal as case study. In order to understand

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EDITOR'S CHOICE

Contributions to Plasma Physics

Electron transfer in proton-hydrogen collisions in dense semi-classical hydrogen plasma

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Abstract

Quantum mechanical calculations have been accomplished to study the dynamics of the reaction: $p + H(1s) \rightarrow H(nlm) + p$ in dense semi-classical hydrogen plasma. Interactions among the charged particles in plasma are represented by a pseudopotential which takes care of the collective effects at large distances and quantum effect of diffraction at small distances. Various capture cross sections are computed for the incident proton energy lying within 10 to 500 keV by applying a distorted wave method which uses a variationally determined closed-form wave function of hydrogen atom. Moreover, an inclusive study is made to explore the effects of screening of plasma and quantum diffraction on various capture cross sections for a wide range of thermal Debye length and de Broglie wave length. It has been found that various cross sections suffer considerable changes due to varying Debye length and de Broglie wave length.

KEYWORDS

charge transfer, distorted wave method, proton-hydrogen collision, pseudopotential, semi-classical hydrogen plasma

1 | INTRODUCTION

The scattering of proton from hydrogen atom is a common process that use to take place naturally in almost every astrophysical environment because of the abundant presence of atomic hydrogen in those environments.[1,2] Consequently, different kinds of important properties of the embedding environment are substantially regulated by this scattering process. Explanation of numerous phenomena associated with the embedding medium often requires the results of various cross sections (CS) of that process.[3,4] For example, explanation of profile and line intensities of absorption or emission of hydrogen atom requires the results of CSs.[4] As a matter of fact, a typical example of ion-atom scattering is the scattering of proton from hydrogen atom in which, depending on the energy, elastic, excitation, ionization, and rearrangement processes are possible to take place. Performing sophisticated quantum mechanical calculations on rearrangement scattering (also called electron or charge transfer process) is a challenging task, and thus the process has attracted the fancy of researchers[5–31] ever since the work of Oppenheimer in vacuum.[5] In plasma environments, reported investigations are relatively small.[20–22] Of late, the authors have investigated the following electron transfer process[22]:

$$p + H(1s) \rightarrow H(nlm) + p \tag{1}$$

in classical non-ideal plasmas by using a distorted wave method.[9] It was found that collision dynamics of the above process suffered considerable changes due to varying non-ideality of the plasma.

In this paper, we focus our attention on the above mentioned electron transfer process in dense semi-classical partially ionized hydrogen plasma. Degree of denseness is important in determining the behaviours of plasma at short distances

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ORIGINAL ARTICLE

Charged strange star in $f(R, T)$ gravity with linear equation of state

Pramit Rej[1] · **Piyali Bhar**[2]

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Abstract Our present study involves the strange stars model in the framework of $f(R, T)$ theory of gravitation. We have taken a linear function of the Ricci scalar R and the trace T of the stress-energy tensor $T_{\mu\nu}$ for the expression of $f(R, T)$, i.e., $f(R, T) = R + 2\gamma T$ to obtain the proposed model, where γ is a coupling constant. Moreover, to solve the hydrostatic equilibrium equations, we consider a linear equation of state between the radial pressure p_r and matter density ρ as $p_r = \alpha\rho - \beta$, where α and β are some positive constants, Both α, β depend on coupling constant γ which have been also depicted in this paper. By employing the Krori-Barua *ansatz* already reported in the literature (J. Phys. A, Math. Gen. 8:508, 1975) we have found the solutions of the field equations in $f(R, T)$ gravity. The effect of coupling constant γ have been studied on the model parameters like density, pressures, anisotropic factor, compactness, surface redshift, etc. both numerically and graphically. A suitable range for γ is also obtained. The physical acceptability and stability of the stellar system have been tested by different physical tests, e.g., the causality condition, Herrera cracking concept, relativistic adiabatic index, energy conditions, etc. One can regain the solutions in Einstein gravity when $\gamma \to 0$.

Keywords General relativity · Compact star · $f(R, T)$ gravity · Causality condition

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1 Introduction

Recently, the LIGO/Virgo Collaboration announced the observation of a merger of a black hole with mass $23.2^{+1.1}_{-1.0}\ M_\odot$ with a compact object with mass $2.59^{+0.08}_{-0.09}\ M_\odot$ (Abbott et al. 2020), where the mass of the secondary component lies within the so-called low mass gap (Bailyn et al. 1998; Özel et al. 2010; Belczynski et al. 2012). Theoretical and observational evidence suggests that black holes of mass less than 5 $M_\odot$ may not be produced by stellar evolution (Özel et al. 2010; Belczynski et al. 2012; Farr et al. 2011). According to some candidate equations of state, a stable neutron star must have a mass of at most 3 $M_\odot$ (Müller and Serot 1996; Rhoades and Ruffini 1974; Özel et al. 2012; Kiziltan et al. 2013). If the mass exceeds this limit, it is hypothesized that neutrons lose their individuality under extreme pressure and breakdown into quarks. A quark star is smaller in size but ultra-dense as compared to the neutron star. However, increased pressure in its core stops quark stars from collapsing into black holes. Moreover, estimates of radii of some stellar objects (LMC X-4, 4U 1820-30, Her X-1, etc.) suggest that their structure and characteristics may be similar to that of strange quark stars. On the other hand, the relatively small tidal deformability measured in gravitational-wave signal GW170817 do not favor such large values of $M_{\max}$ but rather suggest it is of the order of 2.5 $M_\odot$ (Abbott et al. 2018, 2019). The heaviest neutron star observed to date has a mass of $2.01 \pm 0.04\ M_\odot$ (Antoniadis et al. 2013), and the existence of compact objects in the mass regime [2.5, 5] $M_\odot$ is highly uncertain.

From the pioneering work done by Ruderman (1972) it was already proposed that celestial bodies under certain conditions may become anisotropic. The author observed that relativistic particle interactions in a very dense nuclear matter medium could lead to the formation of anisotropies. In-

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THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

Charged compact star in $f(R, T)$ gravity in Tolman–Kuchowicz spacetime

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Abstract In this current study, our main focus is on modeling the specific charged compact star SAX J 1808.4-3658 (M = 0.88 $M_{\odot}$, R = 8.9 km) within the framework of $f(R, T)$ modified gravity theory using the metric potentials proposed by Tolman–Kuchowicz (Tolman in Phys Rev 55:364, 1939; Kuchowicz in Acta Phys Pol 33:541, 1968) and the interior spacetime is matched to the exterior Reissner–Nordström line element at the surface of the star. Tolman–Kuchowicz metric potentials provide a singularity-free solution which satisfies the stability criteria. Here we have used the simplified phenomenological MIT bag model equation of state (EoS) to solve the Einstein–Maxwell field equations where the density profile (ρ) is related to the radial pressure (p_{r}) as $p_{\mathrm{r}}(r) = (\rho - 4B_{\mathrm{g}})/3$. Furthermore, to derive the values of the unknown constants a, b, B, C and the bag constant B_{g}, we match our interior spacetime to the exterior Reissner–Nordström line element at the surface of stellar system. In addition, to check the physical validity and stability of our suggested model we evaluate some important properties, such as effective energy density, effective pressures, radial and transverse sound velocities, relativistic adiabatic index, all energy conditions, compactness factor and surface redshift. It is depicted from our current study that all our derived results lie within the physically accepted regime which shows the viability of our present model in the context of $f(R, T)$ modified gravity.

1 Introduction

Einstein's General Relativity (GR) has continued to withstand the test of time in its predictions of physical phenomena within the realms of astrophysics and cosmology. From the classical predictions of the precession of Mercury's orbit and the deflection of starlight by a massive gravitating body to present day detection of gravitational waves and observations of black holes GR has triumphed. Early attempts seeking solutions of the Einstein field equations which describe stellar objects were crude and for most part unrealistic. The first exact solution of the Einstein field equations describing a self-gravitating sphere was obtained by Schwarzschild. The so-called interior Schwarzschild solution which described a constant density sphere suffered from various pathologies, the most notable being that the propagation speed for any signals within the fluid sphere was noncausal [1]. A survey of exact solutions appearing in the literature describing stellar objects by Delgaty and Lake [2] revealed that only a small subset of solutions meet the rigorous tests for physical viability, regularity and stability of fluid spheres.

The search for more realistic stellar models within GR required researchers to connect the macroscopic properties of stars determined through observations to the microphysics. A new era of stellar modeling was born, which went beyond the mathematical excursion of the Einstein field equations where ad hoc assumptions were made just to generate a toy model. Standard approaches which included assumptions on the metric function, density profiles, pressure profiles, anisotropy parameter and even the matter content which allowed for the system of equations to be integrated gave way to well-motivated techniques intrinsically connected to physics which include an equation of state (EoS), mass profiles linked to surface redshift and compactness of typical stellar structures. The linear EoS which links the radial pressure to the energy density has been generalized to include the microphysics (at least on a phenomenological level) via the so-called MIT bag model. The departure from pressure isotropy makes the modeling of stellar objects mathematically tractable. Imposing a barotropic EoS of the form $p_{\mathrm{r}} =$

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Charged gravastar model in $f(T)$ gravity admitting conformal motion

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In this paper, model of charged gravastar under $f(T)$ modified gravity is obtained. The model has been explored by taking the diagonal tetrad field of static spacetime together with electric charge. To solve the Einstein–Maxwell field equations, along with $f(T)$ gravity, we assume the existence of a conformal Killing vector which relates between geometry and matter through the Einstein–Maxwell field equations by an inheritance symmetry. We study several cases of interest to explore physically valid features of the solutions. Some physical properties of the model are discussed and we match our interior spacetime to the exterior Reissner–Nordström spacetime in presence of thin shell.

Keywords: General relativity; $f(T)$ gravity; gravastar; junction condition.

Mathematics Subject Classification 2020: 83C20, 83D05, 85A15

1. Introduction

In modern cosmology, one of the most important problems is to deal with the dark energy issue which causes the accelerating expansion of the Universe. This phenomenon has been confirmed by numerous observations of large scale structure [1,2] and measurements of the cosmic microwave background (CMB) anisotropy [3, 4]. The source that drives this cosmic acceleration is termed as 'dark energy' and it possesses positive energy density but negative pressure. It is well known that this form of energy acts as a repulsive gravitational force so that in General Relativity (GR) one needs to consider a further non-standard fluid with a negative pressure

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Regular Article - Theoretical Physics

Relativistic compact stars in Tolman spacetime via an anisotropic approach

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Abstract In this present work, we have obtained a singularity-free spherically symmetric stellar model with anisotropic pressure in the background of Einstein's general theory of relativity. The Einstein's field equations have been solved by exploiting Tolman *ansatz* [Richard C Tolman, Phys. Rev. 55:364, 1939] in $(3+1)$-dimensional space-time. Using observed values of mass and radius of the compact star PSR J1903+327, we have calculated the numerical values of all the constants from the boundary conditions. All the physical characteristics of the proposed model have been discussed both analytically and graphically. The new exact solution satisfies all the physical criteria for a realistic compact star. The matter variables are regular and well behaved throughout the stellar structure. Constraints on model parameters have been obtained. All the energy conditions are verified with the help of graphical representation. The stability condition of the present model has been described through different testings.

1 Introduction

Stellar evolution predicts that when the nuclear fuel gets exhausted, the stars turn into highly dense compact objects such as white dwarf, neutron star or back hole. Massive stars undergoing the supernova explosion turn into neutron star and black hole. For neutron star, the main idea is that the gravitational collapse is supported by the neutron degeneracy pressure. The general perception is that for high densities at the core, nucleons have to converted to hyperons or either form condensates. Some studies predict that these nucleons could form Cooper pairs and can be in superfluid state. Based on the MIT bag model, Witten [1] provides the existence of strange quark matter, which indicates that the quarks inside the compact objects might not be in a confined hadronic state. At the high densities and pressures they could form a larger colorless region with equal part of up, down and strange quarks. Consequently, the composition of the core region of compact objects is still an open subject in relativistic astrophysics.

When densities of compact stars are greater than the nuclear matter density, it expects the appearance of unequal principal stresses, called anisotropic effect. This usually means that the radial pressure component p_r is not equal to the transverse component p_t. The presence of anisotropy was first predicted for self-gravitating objects in Newtonian regime by Jeans [2]. Later, Lemaitre [3] considered the local anisotropy effect in the context of general relativity and showed that the presence of anisotropy can change the upper limits on the maximum value of the surface gravitational potential. Ruderman [4] showed that a compact star with matter density ($\rho > 10^{15}$g cm^{-3}), where the nuclear interaction become relativistic in nature, is likely to be anisotropic. Herrera [5] presented the evidence on the appearance of local anisotropy in self gravitating systems in both Newtonian and general relativistic context. Since then, a lot of investigations have been carried out in finding new exact solutions with anisotropy feature.

For half of century, the theory of anisotropic compact stars in General Relativity has been developed. Bower and liang [6] provided the generalization of Tolman–Oppenheimer–Volkov equation in presence of anisotropy. The stability of a stellar model can be enhanced by a presence of a repulsive anisotropic force when $\Delta = p_t - p_r > 0$. This feature leads to more compact stable configurations compare to

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Finch–Skea star model in $f(R,T)$ theory of gravity

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This work discusses about the existence of compact star model in the context of $f(R,T)$ gravity with R as the Ricci scalar and T as the trace of energy–momentum tensor $T_{\mu\nu}$. The model has been developed by considering the spherically symmetric spacetime consisting of isotropic fluid with $f(R,T) = R + 2\beta T$ with β be the coupling parameter. The corresponding field equations are solved by choosing the well-known Finch–Skea *ansatz* [M. R. Finch and J. E. F. Skea, A realistic stellar model based on an ansatz of Duorah and Ray, *Class. Quantum Gravity* **6**(4) (1989) 467–476]. For spacetime continuity, we elaborate the boundary conditions by considering the exterior region as Schwarzschild metric. The unknown constants appearing in the solution are evaluated for the compact star PSR J 1614-2230 for different values of coupling constant. The physical properties of the model, e.g. matter density, pressure, stability, etc. have been discussed both analytically and graphically. This analysis showed that the geometry and matter are compatible with each other as well as the model is in stable equilibrium in the context of $f(R, T)$ modified gravity.

Keywords: Compact objects; $f(R,T)$ gravity; stability.

Mathematics Subject Classification 2020: 83C05, 83D05, 85A05, 85A15

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The Growth And Development Of Children's Literature In Australia: A Brief Survey

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ABSTRACT

This paper proposes to historically chart the initiation, growth and development of the writings for children in the field of Australian Literature. This includes commentary and critical analysis of the persepectives representations in the works of the White and Aboriginal Australian authors and the crosscurrents involved in the process.

KEYWORDS children's literature, Australian literature, White Australian Authors, Aboriginal Australian Authors.

Introduction

In Australian literature, the settlement discourses related to the establishment of Australia and related adventure stories dominate the initial phase. Rhonda M. Bunbury observes, "The origins of published children's literature in Australia actually lie within the efforts of the monocultured, class-bound English who were conscious of the need to bring civilisation to children of a convict colony" (833). Such White-authored texts were caught up in a tension between two kinds of needs. Bradford observes that on the one hand there was the need "to position child readers as young Australians; and on the other [to] manage the colonial past for children" (Reading Race 15). The "strategies of silence and concealment" practised by White authors for this purpose is exemplified in Eve Pownall's The Australia Book (1951) that received the Australian Children's Book Council's 'Book of the Year' award in 1952 (Braford 15). Illustrated by Margaret Senior, this book is accepted as one of the canonical history books for children. Being a history book for White children, it is concerned with representation of childhood, though the way history is presented to the White children also becomes crucial here. The history here begins only with the arrival of the Whites and gives an impression "as though the country was lost in a kind of limbo before being found [by White men], as though untamed and untouched by humans before being settled" (Bradford Reading Race 18). Such mechanism of placing and allowing strategic gaps and omissions for the sake of presenting a benign myth of Australian settlement history to the young readers continued in the school texts and readers, too, that prevailed under the leadership of State Departments of Education. Exploration narratives were accompanied here with maps which were constructed to show the journeys in uninhabited territories. Exploration and adventure narratives, whether written by male or female White authors, were also explicitly discriminatory about gender issues. Since these works represented the imperial

enterprise of discovering new lands as a purely masculine affair, women figures were rarely to be found in them. Examples are Anne Bowman's The Kangaroo Hunters (1859), Edward B. Kennedy's Blacks and Bushrangers (1889) and Hesba Brinsmead's Longtime Passing (1971) where women adorn only the familial domestic space to which the male heroes come back to receive nursing for the bruises they get in fighting with Aborigines during their journeys. These works reiterate the issues of stereotypical masculinity and racial dominance to the White children readers. Captivity narratives of Eliza Fraser and others reiterate in an autobiographic mode the savagery of Aborigines while the Aboriginal autobiographies, like Sally Morgan's My Place (1987), Robert Bropho's The Fringedweller (1980) present the other side of the frontier of White settlement in Australia. Religious texts, however, credited the existence of Aborigines only to depict their development through conversion into Christianity which was identified with "government policies and strategies for managing Aborigines" (Bradford Reading Race 48). Narratives of conversion were common in White authored texts like E. Davenport Cleland's The White Kangaroo (1890) and George Sargent's Frank Layton (1865). In general, there is a common trend of poor treatment of Aborigines and Aboriginal themes with stereotypical Aboriginal and White characters in all these works. The young White readers were provided only with the non-Aboriginal dominant adult viewpoints emphasising the strange and exotic elements about Aboriginality.

During the early years of White settlement in Australia, children's literature – both for school textbooks and for other books – was solely dependent on the supply of books authored and published in Britain. Such supply naturally had nothing to contribute to the idea of Australianness among the readers. Till 1950s, the purpose of the school readers, published by the Education Departments, was, as Charles Long mentions in Victorian Readers, "to be taken in imagination to various parts of the empire, to Europe, and to the United States of America, and thus to gain knowledge of their rich heritage and acquire a well-founded pride of race" (qtd. in Bradford Reading Race 290). Clare Bradford points out that the first ever children's book to be published in Australia—A Mother's Offering to Her Children (1841) by Charlotte Burton—was almost after a century from the initiation of children's literature publication in Britain in 1744 with A Little Pretty Pocket Book by British publisher John Newbery (Reading Race 283).

A Mother's Offering to Her Children records the conversations of a White mother and her children about the geographical, natural and cultural aspects of Australia and its natives in a didactic mode. Addressed to White children, the descriptions here are "of a cultured British migrant viewing the new land through British eyes" (Bradford Reading Race 285). A Mother's Offering to Her Children is also an example of such female authored texts where the White authors create the images of good mothers, "concerned with the feminine work of educating the young", only to contrast with the images of Aboriginal mothers to show the "gulf between civilisation and savagery" (Bradford Reading Race 83).

During this early stage, narratives of adventurous expeditions, shipwreck and finally of kidnap and captivity in the hands of the Aborigines carried out the purpose of informing the intended young White readers about the real nature of the new land. In these works, Aborigines are represented sometimes as "barbaric figures intent on murdering travellers", sometimes as "comic relief", "good natives" or as "half-caste, or brown child [...] torn between two cultures because of mixed racial heritage" (Bradford Reading Race 287). Jeannie Gunn's The Little Black Princess (1905) represents the otherness of Aboriginal childhood as amusing to the implied young White readers. Here the depiction of Aborigines as inferior human beings, according to Bradford, "positions readers as young colonials" (Reading Race 287). Richard Rowe's The Boy in the Bush (1869) is an adventure story where the Aborigines are portrayed as "generally savages, cannibals" (Bradford Reading Race 6). Ethel Turner's Seven Little Australians (1894), published from England, tries to explore the Australianness by exploring the bush culture. The story of the novel centres round the escapades of the children of a White family and their subsequent adventures. Instead of being murderous, Aborigines here are seen to be helpful in conformity with the "colonial trope of loyal black servant who demonstrates the benevolence of his masters" (Bradford Reading Race 288). Clare Bradford points out that an Aboriginal story, which was originally a part of the book in its 1894 edition, was omitted in the edition of 1900 (Reading Race 4). This omission is actually an act of appropriation by "institutional gatekeepers" and exemplifies the susceptibility of White representation of Aboriginality to Western perspectives (MacCann xviii). Portrayals and treatments of settlement violence history and issues relating to contact of cultures have since been remaining a matter of concern for authors of Australian children's literature.

Another kind of depiction of the bush life and culture is found in Mary Grant Bruce's the Billabong books series which was initiated by the publication of A Little Bush Maid in 1910. The compilation of fifteen books in this series published as Billabong Riders in 1942 stood as a great rival of the popularity of the works of Turner who kept writing till 1928. Billabong series shows the reformative journey of city-dwelling characters through their bush experiences at Billabong that represents real Australia, exoticised according to the European perceptions. The representation of Aboriginal childhood here is much like a continuation of Turner's works and is in accordance with the hierarchies of race, gender and class. Angus & Robertson republished the Billabong series in 1993 with new illustrations. Apart from a pointer to its popularity, this event of republication is also important as the text was modified in 1993 to omit "offensive expressions" about Aboriginality (Bradford Reading Race 41). This event of omission is ideologically just the opposite to the omission of the Aboriginal story from Seven Little Australians in 1900. Bradford observes that the "publisher's changes to the Billabong books also raise question about their views of the books' implied readers" as the readership of Aboriginal children multiplied between the years 1900 and 1993 (Reading Race 44).

Romance and fantasy fiction bore the common trend of White authors trying to inform non-Aboriginal readers about Aboriginal concepts, like the Dreaming, by positioning themselves as authorities of the culture. This resulted in stereotyping and Indigenising for the sake of exoticisation. Brooke Collins-Gearing in her essay "Imagining Indigenality in Romance and Fantasy Fiction for Children" comments that "representations of Indigenous culture and people in fantasy and romance narratives are based on narrative practices which are informed by Western society and its values" (32). Representation of Aboriginality and Aboriginal childhood is often motivated by the purpose of projecting Aborigines as a dying race and, for this, elements of Aboriginal culture are carefully selected or rejected in the narratives according to the moral, social and political scheme of the author. Mary A. Fitzgerald's King Bungaree's Pyalla and Stories Illustrative of Manners and Customs that Prevailed Among Australian Aborigines (1891) is one of the earliest examples of this kind of writing. Here the "narrative records Indigenality as belonging to a past time that is slowly vanishing, a construction which presents the idea that a harmonious, but brief, relationship existed in the early days of colonization between colonists and Indigenous peoples. In this way Fitzgerald's fantasy narratives about black/white relationships absolve non-Indigenous child readers from the memory and knowledge of policies and practices of genocide and assimilation" (Collins-Gearing 32). Situating romance and fantasy fictions in the past remained a common strategy among the authors even in twentieth century to avoid the contemporary issues. By taking advantage of the conventions of this genre, unspoilt and blissful pastoral representation of Aboriginal childhood is also found in the twentieth century. Frank Dalby Davison's Children of the Dark People (1936) is an example of such idyllic representations. Portrayal of settler's virtues employed to the betterment of Aborigines was another common trope in the fantasy fictions for children. Ethel Pedley's Dot and the Kangaroo (1899), May Gibbs's Snugglepot and Cuddlepie (1918), Norman Lindsay's The Magic Pudding (1918) and Dorothy Wall's Blinky Bill (1933) are examples where virtues of settler characters have been portrayed through anthropomorphised Australian animal characters.

The Children's Book of the Year Award which started in 1946 and the establishment of Children's Book Council of Australia (CBCA) in 1958 encouraged children's literature production and "by the 1990s at least one in ten books in Australian literature were written for children" (Bennett 257). Whitlam government's 'Multicultural Australia' policy, launched in 1973, gave the impetus to the publications of children's books promoting cultural diversity by exploring race relations to cater to the potential market of multicultural young consumers. Bradford observes that the "dying race" trope waned out in the second half of the twentieth century and Rex Ingamell's adventure narrative Aranda Boy (1952) exemplifies authentic representation of Aboriginal childhood in spite of adhering to principles of "white superiority" and "benevolent white rule" ("Australian Children's Literature" 297). Donnarae MacCann terms this attitude as "paternalistic racism" where "good intentions coupled with white standards, a white

perspective, and an assumption of white superiority" (xxvi-ii). Patricia Wrightson tried to replace the "Western metaethic[s]" of fantasy literature for children in An Older Kind of Magic (1972) and in her novels of the Wirrun trilogy—The Song of Wirrun-The Ice is Coming (1977), The Dark Bright Water (1979) and Behind the Wind (1981) (Stephens and McCallum 7).[1] In describing the adventures of Wirrun, the hero, she took honest efforts in employing "another kind of magic, a kind that must have been shaped by the land itself at the edge of Australian vision" (qtd. in Bradford "Australian Children's Literature" 297). These efforts were not always completely independent of European influences which gave way slowly to more and more realistic representations of White-Aboriginal race relations that are found in the literature produced from 1990s onwards in the writings of James Moloney, Phillip Gwynne and Pat Lowe.

Emergence of Aboriginal authors in the 1960s was crucial in breaking the clichéd formula of representing Aboriginal culture. The first children's book under Aboriginal authorship was a picture book, The Legends of Moonie Jarl (1964), by Wilf Reeves and Olga Miller. Oodgeroo's Stradbroke Deamtime (1972) and The Rainbow Serpent (1975), Dick Roughsey's The Giant Devil-Dingo (1973) were the next to follow. All these works suffered in the hands of major publishing houses since they tried to modify the indigenousness of these works to cater to the need of the non-indigenous readers who were at that time the main consumers of all sorts of indigenous art. It was not until Indigenous publishing houses like Magbala Books and IAD Press came into being that the establishment of culturally different literature was uncompromisingly produced. The role of Aboriginal Arts Board was crucial in the publication of one of the landmark works in Aboriginal children's literature, The Aboriginal Children's History of Australia (1977). The then chairman of AAB, Wandjuk Marika, wished to awaken "Aboriginal children ... to an awareness of ... identity and pride in their past" by incorporating "written and painted contributions from Aboriginal children from forty-nine schools around Australia" (Toorn 40). Daisey Utemorrah and Pat Torres's Do Not Go Around the Edges (1990) freely employs Aboriginal narrative strategies in a most striking way to destroy stereotyped White narrative modes:

> Utemorrah's autobiographical story is placed along the bottom of the pages, while her poems are placed in the body of each page, framed within Pat Torres' illustrations. The border that runs along the lower edge of each page features the

[1] This expression was originally used by John Stephens and Robyn McCallum to describe the European influences that inform the construction of mythological, legendary or fairy tales (Stephens and McCullam 6-9).

> three sacred beings known in Wunambal culture as Wandjinas, orienting the various narrative and thematic strands of the book in relation to the ancient stories of the Dreaming. Relationships between these strands are elusive, as most of the poems in the book connect only tangentially with Utemorrah's autobiographical story. Readers accustomed to the reading practices usual in Western picture books will search in vain for thematic and symbolic interactions between verbal and visual texts, and this very complexity disrupts any simplistic notion that Do Not Go Around the Edges can be read as a mixture or blending of elements from different cultures. Rather, its multiplicity of narratives and systems of meaning destabilises the domination of British culture and standard English. (Bradford, "Australian Children's Literature" 298-9)

Lionel Forgarty's Booyooburra (1993) is full of colloquialised Aboriginal English and Aboriginal artist Sharon Hodgson's illustrations to represent the author's inclination towards oral culture. Aboriginal artist Bronwyn Bancroft enriched children's books by illustrating celebrated works like Oodgeroo's Stradbroke Dreamtime and Sally Morgan's Dan's Grandpa with illustrations that make Aboriginal culture come alive. My Girragundji (1998), Maybe Tommorrow (1998) and The Binna Binna Man (1999) by Meme McDonald and Boori Pryor are examples of collaborative works of Aboriginal and White authors. They successfully locate their stories in Aboriginal cultural domain and often employ non-European narrative and discursive traditions.

As an author of children's literature, Jack Davis incorporates different facets of Aboriginality, like oral traditions, language, song, music, dance and other cultural elements to inculcate the ideological system of Aboriginality into young readers and audiences. Though he was writing his plays in the 1980s, when Aboriginal readership grew to a considerable number, he meant his plays primarily to be staged than to be published between the covers to exploit the added advantage of this literary form to directly re-present his culture through the performances. Along with the growth of Aboriginal readership and publication units, the 1980s is also notable for being the initial stage of multicultural Australia and the decade of Aboriginal protests against the bicentennial celebrations of White settlement in Australia. As a children's author, Davis takes effort in solving the racial conflict in his children's plays to reach a harmonious state at the ends of the plays. The readings of the children's plays reveals that, unlike other plays of Davis, his children's plays promote Aboriginality without reiterating the issue of wronged past that preoccupies his all other plays. The fact that his firebrand re-appropriational stance as an Aboriginal playwright is replaced with a reconciliatory approach in these plays indicates Davis's success as an author for children.

On the other hand Davis's representations of childhood in his adult plays portray childhood under the corruptive influence of the White culture and even the Aboriginal adults inside the families. In these plays Davis is uncompromisingly realistic in his

portrayal of the issues related to Aboriginal politics. Hence, the children characters here suffer a premature contamination of the evils and maturity of the adult world.

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Induction of Chlorophyll and Morphological Mutations through Gamma Ray in Traditional Aromatic Cultivar Tulaipanja

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The induced mutation of the traditional aromatic cultivar may provide useful alternative or complement to natural variation which may be used directly in mutation breeding or as a source of germ plasm in hybridization programme. Induced mutations irradiated through gamma ray in aromatic cultivar Tulaipanja were studied for chlorophyll and other morphological characters in the M2 generation. The frequency of chlorophyll mutations was high in higher doses. Among the chlorophyll mutants studied, albina was the most frequent, followed by alboxantha, alboviridis, xantha, viridis and striata. The mutation efficiency and the mutagenic effectiveness of the mutagen is more in the lower dose. The semi-dwarf mutants were more prevalent followed by dwarf and semitall-I mutants. The number of height mutants is much more in lower dose than that of higher dose. Among the morphological mutants, a number of mutants with broom stick leaf and few mutants with grassy leaf, rolled leaf, striped leaf were obtained. Besides these, delayed flowering mutants were obtained in low frequency in both the doses while the early flowering mutants were obtained only in the lower dose. The desirable dwarf or semi-dwarf early flowering mutants may be utilized directly or for recombination breeding, whereas the high yielding lines screened may be used directly as aromatic cultivar provided if the performance in the later generation is good.

Keywords: Aromatic rice; Chlorophyll mutants; Induced mutation; Morphological mutants.

India is well acquainted for the production and supply of aromatic rice in the national and international market. Tulaipanja is a traditional non-basmati aromatic cultivar which is cultivated in the agro-climatic condition of West Bengal, but it is somehow neglected for its poor yield. The induced mutation of this aromatic cultivar may provide useful alternative or complement to natural variation which may be used directly in mutation breeding or as a source of germ plasm in hybridization programme. Large random variation can be produced through induced mutation in short time in a chosen genetic background. But one of the most important disadvantage of induced mutation is the undesirable effects produced by the pleiotropic action of the mutant gene or simultaneous mutation of closely linked genes. Mutagenic treatments of seeds with different doses showed a definite increase or decrease in sensitivity to treatments which can be shown as mutation frequency in early generation like M_2. Mutagenic efficiency is the proportion of mutation in relation to understandable changes like lethality, injury or sterility and mutagenic effectiveness is a measure

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of the frequency of mutation induced by a unit dose of mutation[1]. To understand such desirable and undesirable changes as well as the frequencies of various kinds of mutations in early generation like M_2 of aromatic traditional non-basmati rice after treatment with various doses of mutagen is very much useful to select the effective mutagen along with its proper doses for the study of mutation breeding and its effectiveness in crop improvement programme to evolve high yielding aromatic rice.

MATERIALS AND METHODS

Dry bold and unhusked seeds of traditional aromatic non-basmati rice cultivar 'Tulaipanja' were irradiated with two different doses of gamma ray viz., 200 Gy and 300 Gy to raise M_1 generation. The number of seeds treated for each treatment was five hundred. Seeds of Tulaipanja which were not exposed to treatment involved in this investigation were used as control. Seeds of each M_1 single plant along with control Tulaipanja harvested separately and individually were used to grow M_2 generation. Seeds from each M_1 plant along with control were soaked in water separately and incubated for germination. The germinated seeds from each M_1 plant along with control were sown in separate individual earthen pots with requisite agricultural practices to generate M_2 plants. After seven days of germination, chlorophyll mutations were screened. At this stage, the first leaf was fully developed. The total number of M_2 seedlings in each earthen pot, the number of chlorophyll mutations and their types were counted and recorded. The chlorophyll mutants were classified following Gustafsson[2]. A single seedling per hill was then transplanted in the field to generate individual progeny row. The M_2 populations were thoroughly screened in various developmental stages and identified for chlorophyll and other morphological mutations based on visual observations and quantitative data. Mutants were also identified on the basis of changes in morphological characters. The following formulae were used to estimate the mutation efficiency and mutagenic effectiveness:

Mutagenic Efficiency = Mutation Frequency in M_2/ Percentage of sterility in M_1 and

Mutagenic Effectiveness = Mutation Frequency in M_2/ Dose of mutagen

RESULTS AND DISCUSSION

The mutation frequencies based on M_2 generation were found to be most effective to consider actual frequency for mutation breeding programme[3]. The plants thoroughly examined for deviation of characters from the parent and the suspected mutants were screened. The M_2 plants deviating distinctly from the mother variety with regard to colour, structure, stem, leaf, panicle, grain and other characters were counted as mutants.

The frequency of chlorophyll mutations in M_2 generation is presented in Table 1. The chlorophyll deficient types exhibited deficiency in chlorophyll formation in different plant parts which appeared at different stages of development. While some of the chlorophyll mutants were nonviable types and died at the seedling stage, several others were viable chlorophyll mutant, producing normal grains. In this present investigation, various kinds of chlorophyll mutations observed are classified as albina, xantha, alboxantha, striata, viridis and alboviridis which may be lethal or nonlethal (Table 2). Mutagenic efficiency and mutagenic effectiveness were estimated (Table 3). Different types of morphological mutants found were plant height mutants like dwarf, semi-dwarf, semi-tall and tall as well as leaf mutants like rolled leaf, broom stick leaf, grassy leaf and striped leaf and also early flowering and late flowering mutants (Table 4). Similar observations were also made by Sharma *et al*.[4]. The above mentioned mutants

Table 1. Frequency of chlorophyll mutations in M_2 generation

Treatment	Total no. of M_2 seedlings investigated	No. of mutant seedlings	Frequency of chlorophyll mutations per 1000 M_2 seedlings
200 Gy	11585	176	15.19
300 Gy	7050	145	20.57

Table 2. Chlorophyll mutations spectra in M_2 generation

Treatment	Frequency of different chlorophyll mutant classes														Total no. of mutants	Percent of mutant
	Albina		Xantha		Viridis		Striata		Alboxantha		Alboviridis					
	a	b	a	b	a	b	a	b	a	b	a	b				
200 Gy	114(66.47)	1.01	0.00(0)	0.00	11 (6.25)	0.10	0.00 (0)	0.00	26 (14.77)	0.22	22 (12.5)	0.19			176	1.52
300 Gy	109 (75.17)	1.55	13 (8.96)	0.18	0.00 (0)	0.00	6 (4.14)	0.09	17 (11.72)	0.24	0.00 (0)	0.00			145	2.06

a : No. of mutant seedlings recorded in M_2 generation
b : Frequency of respective particular chlorophyll mutation per 100 M_2 seedlings
Figures in parenthesis indicates percentage of individual chlorophyll mutation in particular respective dose

were not noticed in M_1 generation, but appeared in M_2 generation reflecting the recessive nature of mutation for the above mentioned characters.

In M_2 generation, the frequency of chlorophyll mutations was high in 300 Gy dose than the 200 Gy dose which were 20.57 and 15.19, respectively, per 1000 M_2 seedlings (Table 1). So, the abundance of induced chlorophyll mutations proportionately increased with the increment of dose. The results are comparable with Chakraborty and Kole[5]. In the mutation breeding programme, the chlorophyll mutants are considered to be the important measure for the mutagenic property[6].

Among the chlorophyll mutants (Table 2), the frequency of *albina* was highest in both 300 Gy and 200 Gy doses which was, however, higher in the dose of 300 Gy than the dose of 200 Gy. The frequency of *albina* was found to be 1.55 in 300 Gy and 1.01 in 200 Gy. The *xantha* and *striata* mutants appeared in the 300 Gy only with the frequency of 0.18 and 0.09, respectively. The frequency of mutant *alboxantha* was found more in the higher dose of 300 Gy (0.24) than the lower dose of 200 Gy (0.22). Further, *viridis* and *alboviridis* appeared in the lower dose only with a frequency of 0.10 and 0.19, respectively.

While comparing the mutation spectrum of the two doses of gamma rays, it was observed that *albina* was the most frequent chlorophyll mutant in both the doses. Sharma *et al*.[7] and Singh and Singh[8] also observed that the *albina* was the predominant type of mutants. The second next most frequent group was *alboxantha*. Although, *xantha* and *striata* did not appeared in the lower dose, but *viridis* and *alboviridis* were noticed in the lower dose only. So, in general, the frequency of chlorophyll mutation was increased with the increase of dose of gamma ray as also reported by Singh *et al*.[9]. A wide range of variations in the frequency of chlorophyll mutations was observed. So according to their occurrence, they may be placed as *albina,* followed by *alboxantha*, *alboviridis*, *xantha*, *viridis* and *striata*.

To isolate the desirable mutants, it is important to estimate the mutation efficiency and mutagenic effectiveness of a mutagen from a large population. The results indicated that the mutation efficiency (0.06 in 200 Gy and 0.03 in 300 Gy) and mutagenic effectiveness (0.008 in 200 Gy and 0.007 in 300 Gy) of the mutagen is more in

the lower dose of 200 Gy than the higher dose of 300 Gy (Table 3). The low estimates may be due to the amount of damage in the earlier generation that accounted for the mutability of genes[5].

The frequency of various morphological mutants estimated per 1000 M_2 plants (Table 4) was higher in lower dose of 200 Gy (16.91) than the higher dose of 300 Gy (11.58).

Plant height mutants were primarily characterized by reduction in height and a wide range of variations in this trait was observed. For the sake of convenience, the mutants were classified as dwarf (below 90 cm), semi-dwarf (90 cm to 110 cm), semi-tall (above 90 cm and upto 130 cm), semitall-II (above 130 cm and up to 140 cm) and tall (above 140 cm). Among the plant height mutants, semi-dwarf type was more prevalent followed by dwarf and semitall-I mutants in both the 200 Gy and 300 Gy doses. The frequency of semi-dwarf, dwarf and semi-tall-I mutants was 5.52, 2.21 and 0.55, respectively, in 200 Gy of dose and 3.68, 2.02 and 1.29, respectively, in 300 Gy of dose. The semitall-II and tall mutants were obtained with a lower frequency of 0.18 and 0.18 respectively, in 200 Gy and 0.92 and 0.37 respectively, in 300 Gy. The number of height mutants is much more in lower dose of 200 Gy than that of higher dose of 300 Gy. Most of the dwarf mutants had higher number of tillers, short panicles with high spikelet sterility. The semi-dwarf mutants had higher number of tillers along with higher number of filled grains and erect leaves. Semi-dwarf and dwarf mutants were also isolated[5,8,10]. Induced mutants with tall habit were also visualized[5,8,11].

Various other types of morphological mutants were obtained in M_2 generation (Table 4). Among the morphological mutants, a number of

Table 3. Efficiency and effectiveness of mutagen in the local aromatic cultivar 'Tulaipanja'

Treatment	No. of M2 plants studied	No. of mutants in M_2 generation	Mutation rate (%)	% of Sterility in M_1 generation	Efficiency of mutagen	Effectiveness of mutagen
200 Gy	11585	176	1.52	27.39	0.07	0.008
300 Gy	7050	145	2.06	63.33	0.33	0.007

Table 4. Frequency and spectrum of different morphological mutants in M_2 generation of local aromatic cultivar 'Tulaipanja'

Mutant characters	No. and frequency of morphological mutants					
	200 Gy(3674)		300 Gy(1765)		Total(5439)	
	a	b	a	b	a	b
Dwarf	12	2.21	11	2.02	23	4.23
Semi-dwarf	30	5.52	20	3.68	50	9.19
Semi-tall-I	3	0.55	7	1.29	10	1.84
Semi-tall-II	1	0.18	5	0.92	6	1.10
Tall	1	0.18	2	0.37	3	0.55
Late flowering	3	0.55	6	1.10	9	1.65
Early flowering	16	2.94	0	0.00	16	2.94
Rolled leaf	0	0.00	6	1.10	6	1.10
Broom stick leaf	23	4.23	0	0.00	23	4.23
Grassy leaf	0	0.00	1	0.18	1	0.18
Striped leaf	1	0.18	2	0.37	3	0.55
Sterile mutants	2	0.37	3	0.55	5	0.92
High yield	1	0.18	2	0.37	3	0.55
Total/Frequency	93	17.09	65	11.95	158	29.03

a : No. of respective individual mutant plants

b : Mutant Frequency for respective character per 1000 M_2 plants

Figures in parenthesis indicated total no. of mutant plants evaluated

mutants with broom stick leaf with a frequency of 4.23 were obtained in 200 Gy dose only. Besides this, grassy leaf, rolled leaf, striped leaf mutants were also obtained with a low frequency. The frequency of these mutants varied from 0.18 to 1.1.

The grassy leaf mutant was characterized by typical grassy leaves mostly with profuse and thin tillers. Culms were thin, weak and spreading. Leaves were narrow, droopy and pale green in colour. Single grassy leaf mutant was obtained in the dose of 300 Gy with a frequency of 0.18. The plant was short with a height of 42 cm. The panicles were very short. The grains were awned and smaller than control with high amount of spikelet sterility.

The rolled leaf mutants were characterized with rolled leaves. The rolling of leaves was more in early stage, which become semi-rolled at maturity. The mutants had erect and thin culms with semi-erect, narrow and green leaves. The panicles were short. The frequency of rolled leaf mutants was 1.10 in the dose of 30 Gy, whereas, it was not found in 200 Gy of dose. The height of the mutant plants ranged from 85 to 105 cm.

The striped leaf mutants had leaves with yellowish to white stripes. Three to four leaves were striped and the rest were normal. The mutants were tall with thick, spreading culms and droopy leaves. The frequency of striped leaf mutants obtained in the dose of 300 Gy is 0.37 and it was 0.18 in 200 Gy of dose. The heights of the two plants found in 300 Gy of dose were 141 cm and 137 cm. The height of the striped leaf mutant noticed in 200 Gy of dose was 140 cm. The broom stick leaf mutants were characterized with brush or broom stick or needle like leaves. The mutants were short in height having erect culm. The panicles were short and more than fifty percent of the grains were chaffy. The broom stick like appearance was due to excessive rolling of the leaves. The mutants were obtained in the dose of 200 Gy with a frequency of 4.23. This kind of mutant was not noticed in higher dose. All the mutant plants recovered were dwarf with the height ranging from 53 to 85 cm. except five mutant plants which were semi-dwarf in nature. These kinds of morphological mutants were also noticed earlier[5].

The other kinds of mutants observed in M_2 generation were early flowering and delayed flowering mutants. The early flowering mutants were characterized by the earliness of heading time, where the date of panicle emergence of those mutants was around ten days earlier than the control. The date of heading was delayed by one month for delayed mutants as compared to control as well as the panicle exersion were poor and incomplete. Among the other mutants, delayed flowering mutants were obtained with a frequency of 0.55 in 200 Gy of dose and 1.10 in 300 Gy of dose and the early flowering mutants were obtained only in the lower dose of 200 Gy with a frequency of 2.94. The delayed flowering mutants were associated with reduced culm length which were erect and thick. The panicles were short and the grains were chaffy. The height of the mutants ranged from 98 cm to 107 cm. The early flowering mutants obtained in 200 Gy dose were tall and identical with control. The height of the mutants ranged from 125 cm. to 145 cm. Early flowering mutants were also visualized by several researchers[5,8,12,13]. The delayed flowering mutants in rice were also visualized[14].

The sterile mutants were obtained in both 200 Gy and 300 Gy doses as was also noticed earlier in the M_2 generation[11,15]. These mutants produced one or two grains only and had 99.5% sterile pollen grains. The mutants had semi-erect and thick culms with narrow green leaves. The height of the mutants ranged from 75 cm. to 110 cm.

So in general, the chlorophyll mutants which are of common occurrence in this present investigation have been used as a measure of mutagenic action in the mutation breeding experiments[16]. These are potentially useful in understanding the different physiological functions and effects of specific gene products and have been utilized for the study of mutation frequency and mutation spectrum[17].

Different classes of height mutants viz., dwarf, semi-dwarf, semi-tall-I, semi-tall-II and tall were recovered. The highest frequency was observed in semi-dwarf followed by dwarf, semi-tall-I and semi-tall-II. Tall mutants were also obtained, but with very low frequency in both the doses. Hence it can be concluded that short culm mutants could be induced in rice rather easily through gamma ray treatment with proper dose. The frequencies of dwarf and semi-dwarf plants were high in lower dose of 200 Gy and low in higher dose of 300 Gy, while the frequency of semi-tall-I, semi-tall-II and tall were more in higher

dose of 300 Gy and small in the lower dose of 200 Gy. The study also reveals that these mutants are phenotypically distinct from each other and form a varied group which could be considered as major class of mutations occurring with a very high frequency indicating that height locus have a number of mutational sites, sensitive to mutagenic treatments. All the short culm mutants were associated with changes in a number of other morphological characters related to yield, indicating that the mutant genes might have pleiotropic effect.

A few high yielding mutants with good performance for yield and yield attributing traits were observed in both the treatments, but it was more in higher dose of 300 Gy. Such kind of high yielding induced mutants in rice were also noticed earlier[5,8,11,13].

CONCLUSION

Considering the objective of the present investigation, the quantification of mutation frequency based on M_2 generation provides useful picture which will be helpful for mutation breeding programme of aromatic rice. It is very much effective for the selection of mutagen and ideal dose for the breeders. The genes associated with reduced height and early flowering may play important role to evolve short statured aromatic rice cultivar. The aromatic mutants with important characters like dwarf or semi-dwarf nature of height, early flowering may be utilized directly or for recombination breeding, whereas the high yielding lines may be used directly as aromatic cultivar of rice provided the performance in the later generations is stable.

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Isotropic Buchdahl's relativistic fluid sphere within $f(R, T)$ gravity

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ABSTRACT

The aim of the research is to look into a new solution for isotropic compact stars in the context of the $f(R, T)$ theory of gravity. We used the Buchdahl (1959) metric potentials as input to deal with the field equations in the $f(R, T)$ framework. For different values of the coupling parameter χ, graphical representation of the model parameters have been shown to canvass the analytical results more clearly. Interestingly, we have proven that for $\chi = 0$, the standard General Relativity (GR) results can be recovered. A comparison of our obtained solutions with the GR results is also discussed. To study the effect of the coupling parameter χ, the numerical values of the different physical variables have been tabulated for the values of the coupling parameter $\chi = 0, 0.25, 0.5, 0.75, 1, 1.25$. We used the compact stars candidate LMC X-4 with mass= $(1.04 \pm 0.09) M_{\odot}$; Radius $= 8.301^{+0.2}_{-0.2}$ km. respectively, for graphical analysis. To determine the physical acceptability of the model, we looked into the necessary physical properties such as energy conditions, causality, hydrostatic equilibrium, and pressure–density ratio etc. and found that our system satisfies all of these criteria, indicating that the model is physically reasonable.

1. Introduction

Massive stars explode as supernova to the end of their life and yield extremely compact objects with an average density of 10^{14} gm cm^{-3}. The internal matter of these compact objects is compressed by the strong gravitational fields to densities that range from sub-saturation to a few times nuclear saturation density, $n_0 = 0.16$ fm^{-3} (Glendenning, 2012). In 1934, Baade and Zwicky (1934) set up the idea that massive compact stellar objects could form, establishing the theory that a supernova might produce a small, super dense star.

There are two distinct theories that might be used to settle the argument over how to account for the universe's accelerating expansion. One is the possibility that mysterious dark energy exists, as well as its possible expansions, such as modified gravity theories. The cosmological constant, which represents a constant energy density of the vacuum and satisfies cosmological data, is the simplest illustration of dark energy. This problematic nature of cosmological constant has motivated intense research for alternative theories of gravity extending the Einstein's theory of gravity. This leads to the search for a different gravity theory that can answer the universe's current acceleration phase. Alternative explanations have been demonstrated to be capable of adequately describing cosmological observations. One of the simplest possible modification is the $f(R)$-gravity. Another alternative theory of gravity is so called $f(R,T)$ gravity. An interesting aspect of $f(R,T)$ theory is that it may provide an effective classical description of the quantum properties of gravity. In addition to improving fundamental understanding, this theory has produced certain results. The other motivations are related to reconstructing $f(R,T)$ gravity from holographic dark energy, cosmological and solar System Consequences, anisotropic cosmology, non-equilibrium picture of thermodynamics, a wormhole solution, and some other relevant aspects. However, it is vital to do astrophysical research, such as using relativistic stars, in order to develop a suitable gravity theory. Some justifications for these theories are based on the idea that relativistic stars in a strong gravitational field may distinguish between the fundamental laws of gravity and its generalizations. Considering all the facts, we consider here $f(R,T)$ gravity theory from the set of alternative theories of gravity. By considering modified theories of gravity like $f(R,T)$ gravity, the problem of accelerated expansion of the universe can be resolved (Harko et al., 2011). The $f(R, T)$ gravity offers an alternate explanation for the current cosmic acceleration without requiring the introduction of either an exotic dark energy component or the creation of additional spatial dimensions. Cosmic acceleration in $f(R, T)$ gravity may be caused by matter contents in addition to geometrical contributions to the total cosmic energy density (Zubair et al., 2016).

The $f(R,T)$ theory has become increasingly popular among researchers in recent decades. Harko et al. (2011) studied $f(R,T)$ modified theories of gravity, in which the gravitational Lagrangian is given

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VERMICOMPOSTING - THE USEFUL TECHNOLOGY FOR THE CONVERSION OF BIODEGRADABLE WASTES INTO DESIRABLE PRODUCTS FOR PLANTS

K. M. HASIB

The undesirable enormous wastes created as a result of overgrowing population of this planet is increasing rapidly in the surface of soil causing pollution and affects the environment remarkably. These kinds of pollution significantly affect the various life forms. The biodegradable wastes may be used for the production of vermicompost to utilize it for the growth and development of plants. Such kind of organic fertilizers can be used effectively in both rural and urban areas. Vermicomposting is the useful to convert the biodegradable wastes to nutrient rich organic manure with the help of microorganisms and earthworms. Various species of earthworms and microorganisms plays important roles for the improvement of soil. The increasing use of inorganic fertilizer along with pesticides, insecticides etc. affect the environment adversely and also destroy the inherent properties of soil. The application of inorganic fertilizers for long time reduces the fertility of soil and is detrimental for future. Therefore, the use of these kinds of harmful substances should be reduced. Vermicompost made from biodegradable wastes in association with earthworms, microbes etc. provides essential nutrients for the plants. The article emphasized the exploitation of enormous biodegradable wastes to produce vermicompost considering various aspects of it like concept of vermicomposting, requirements, methods of production, process and dose of application, nutrients available in the vermicompost, advantages and disadvantages and precautions during vermicomposting.

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Studies on Internode Length and Culm Anatomy of Induced Mutants of Aromatic Rice

K. M. Hasib

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ABSTRACT

Dry unhusked seeds of Tulaipanja, a tall aromatic *indica* rice, were irradiated with 200 Gy and 300 Gy doses of gamma rays for inducing short height mutants. A number of non-lodging true-breeding height mutants were studied in advanced generation. The number and length of the internodes of various mutants along with their parent Tulaipanja were studied for alteration in these characters for height reduction and culm anatomy for stiff-strawed non-lodging habit. There was no alteration in the number of identifiable internodes in the short culm mutants. All the mutants and the control Tulaipanja showed progressive decrease in individual internode length from the top (numbered in descending order) to downwards, with the panicle bearing internode (number one) being the longest. However, the mutants showed variation in the pattern and degree of reduction of individual internodes. All the mutant lines and control Tulaipanja except one mutant line (33-9-15) had almost similar number of vascular bundles. The thick band of sclerenchymatous tissue in the hypodermal region in the stiff-strawed mutant 88-8-3 may contribute to the rigidity of culm for non-lodging habit.

Keywords Internode, Culm anatomy, Induced mutants, Aromatic rice.

INTRODUCTION

The development of short statured non-lodging semi-dwarf plant is the important breeding objective in crop improvement program. A significant part of the success of the 'Green Revolution' in the 1960s resulted from the breeding of grain crops that had more efficient plant architecture (Khush 2001). The short statured non-lodging habit of the plant is associated with some morphological or anatomical features of stem which have a close relationship with yield. Lodging is the most important factor associated with reduction of grain yield and may reduce the grain yield significantly. The major constraints in increasing grain yield of traditional aromatic rice varieties are the lack of response to higher doses of fertilizers and susceptibility to lodging. Tulaipanja is such type of local aromatic tall cultivar which is susceptible to lodging. Mutants were isolated from such aromatic cultivar through induced mutation by gamma ray irradiation. These mutants are semi-dwarf in nature having superior plant type and are resistant

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Stepwise Regression Analysis in Induced Mutants of Aromatic Non-Basmati Rice

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ABSTRACT

A population of 28 true-breeding induced mutants of aromatic non-basmati rice with its mother Tulaipanja was grown during warm wet season for two consecutive years. Data on ten important morphological characters were recorded. Stepwise multiple regression analysis was performed for identifying key yield determining traits in the mutant population. Stepwise regression analysis in the first year revealed that harvest index was the most important determinant of yield, which secured 1st position in the final regression analysis in the advanced generations. Harvest index alone accounted for 60.460% in first year and 39.443% in second year for the total variance in grain yield. The next important determinant was number of panicles per plant which appeared in 2nd position in first year and 3rd position in second year in the final regression analysis. Panicle length was the next important determinant for grain yield.

Keywords Regression, Forward selection, Quantitative characters, Induced mutants, Aromatic rice.

INTRODUCTION

There is a great demand of aromatic rice in the whole world. It has special market in world rice trade and fetches premium price. India and its subcontinent are popular for the cultivation and production of scented rice. Tulaipanja is popular landrace of aromatic rice in northern part of West Bengal. But its yield potential is low due to inefficient partitioning of biomass and susceptibility to lodging. Gamma ray induced mutation with a view to developing new plant type resulted in a number of promising mutant families with improvement in different agro-botanical characters. It is important to know the key yield determining traits in such mutant population. Kole *et al*. (2008) reported that selection favoring higher panicle number per plant, test weight and straw weight and medium plant height with a reasonable balance for moderate grain number would help to achieve higher grain yield in induced mutant population of aromatic non-basmati rice. Statistical analysis like stepwise regression method provides useful information for breeding program. Stepwise multiple regression analysis is used for estimating the contribution of a given trait to productivity with other traits held constant and determining the choice

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Regular Article - Theoretical Physics

Charged strange star model in Tolman–Kuchowicz spacetime in the background of 5D Einstein–Maxwell–Gauss–Bonnet gravity

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Abstract In this article, we provide a new model of static charged anisotropic fluid sphere made of a charged perfect fluid in the context of 5D Einstein–Maxwell–Gauss–Bonnet (EMGB) gravity theory. To generate exact solutions of the EMGB field equations, we utilize the well-behaved Tolman–Kuchowicz (TK) *ansatz* together with a linear equation of state (EoS) of the form $p_r = \beta\rho - \gamma$, (where β and γ are constants). Here the exterior space-time is described by the EGB Schwarzschild metric. The Gauss–Bonnet Lagrangian term $\mathcal{L}_{GB}$ is coupled with the Einstein–Hilbert action through the coupling constant α. When $\alpha \to 0$, we obtain the general relativity (GR) results. Here we present the solution for the compact star candidate EXO 1785-248 with mass$= (1.3 \pm 0.2)M_{\odot}$; radius $= 10^{+1}_{-1}$ km. respectively. We analyze the effect of this coupling constant α on the principal characteristics of our model, such as energy density, pressure components, anisotropy factor, sound speed etc. We compare these results with corresponding GR results. Moreover, we studied the hydrostatic equilibrium of the stellar system by using a modified Tolman–Oppenheimer–Volkoff (TOV) equation and the dynamical stability through the critical value of the radial adiabatic index.The mass-radius relationship is also established to determine the compactness factor and surface redshift of our model. In this way, the stellar model obtained here is found to satisfy the elementary physical requirements necessary for a physically viable stellar object.

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1 Introduction

Owing to the difficulties encountered by the general theory of relativity (GTR) in explaining the anomalous behavior of gravitational events such as the accelerated expansion of the cosmos in a late-time [1,2], alternative or extended gravity theories have suddenly gained considerable importance. Conjecturing the presence of exotic matter fields, including quintessence fields (QFs), ghost fields (GFs), dark energy (DE), and dark matter (DM), to name a few, is one approach to solving this problem. There is currently no empirical evidence for these conjectures, but a variety of experiments are being carried out. In this concern, de Rham [3] proposes that the graviton is not massless but actually bears a small mass to explain the dark sector. This has several implications for physics, which have already been addressed previously in the literature. Reexamining the geometrical side of the field equations offers an alternative approach, meanwhile higher curvature impacts may have a role to play. Specifically, the Einstein–Gauss–Bonnet (EGB) theory has shown to be promising in this aspect and is hence widely investigated. It should be noted that the EGB is part of a more generic category of theories named Lovelock's polynomial Lagrangians which are the most comprehensive tensor theory yielding at most 2nd-order motion equations. The most common theory is owed to Horndeski [4] if one allows the Lagrangian to involve both tensor and scalar fields. The reality that the Gauss–Bonnet Lagrangian naturally manifests in the applicability of heterotic string theory at the low energy limit [5] provides another compelling argument in favor of the EGB theory. For inhomogeneous distributions of dust [6,7] and null dust [8], the causal structure of the singularities deviates

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New classes of wormhole model in $f(R,T)$ gravity by assuming conformal motion

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ABSTRACT

The two models of wormhole in $f(R,T)$ gravity using relationship between radial and transverse pressure is discussed in the article. To obtain the wormhole model, we used a separable functional form given by $f(R,T) = f_1(R) + f_2(T)$. R is the Ricci scalar, and T is the trace of the energy momentum tensor, with $f_1(R)$ and $f_2(T)$ being arbitrary functions of R and T, respectively. We also explored the possibility of wormhole (WH) solutions by assuming that the spacetime admits conformal killing vectors. Using different values for the coupling parameter γ, we studied the viable solutions and graphically analyzed the various features of these models. It can also be noted that the energy conditions are violated for our anisotropic model and isotropic model violates null energy condition (NEC) for $\gamma = \mathbf{0}, \mathbf{-2}, \mathbf{-4}$ while holds NEC for $\gamma = \mathbf{2}, \mathbf{4}$. Hence, the anisotropic WH throat is supported by exotic matter and the isotropic by exotic/non-exotic (i.e. $\gamma = \mathbf{0}, \mathbf{-2}, \mathbf{-4}$ & $\gamma = \mathbf{2}, \mathbf{4}$) although not an interesting model as there is no opening throat.

1. Introduction

In the early days of research on black holes, before they had no proper name, physicists were still not sure as to whether these type of strange things actually did exist in reality. They could have been a result of the complicated mathematics used in the very recent general theory of relativity (GTR), which describes gravity at the time. However, the recent detection of gravitational waves (GWs) (Abbott et al., 2016) confirms that stellar-mass black holes are very real and even truly exist here in our universe. Interestingly, in 1916, Flamm (1916) discovered that Einstein's equations exhibit for another solution, very recently known as a white hole.

Nowadays, Wormholes (WH) are another strange theoretical prediction from general relativity. Conceptually these are fantastical looking tunnels connecting distant locations in a same universe or a parallel universe, that can travel without violating causality condition. Its existence remains still in doubt. This concept came from white holes, as opposite to black holes, were thought to release matter and light from their event horizon. These two solutions might be two distinct regions of spacetime connected by a channel. Two pioneer scientists Einstein and Rosen (1935), first put forwarded the concept in 1935 by naming that channel as a "bridge". So these channels are also known as "Einstein–Rosen bridge". They investigated the strange equations and asked what they actually stood for. These equations are now known to describe the inescapable pocket of space known as a black hole. According to Einstein and Rosen, the surface of a black hole may hypothetically serve as a bridge connecting to another region of space. The term "wormhole" was first introduced historically by Mishra et al. (2020) a few decades later. WH has since become a focus for researchers looking into new areas of study. The WH has long been used as a crucial plot by science fiction authors and movie script writers. Through these tunnel like structures, characters can travel over vast distances in spacetime from Point A to Point B in a matter of seconds. For decades, several theorists have pondered the existence of these spacetime portals, but no one has been able to provide physical evidence of their existence until recently. However, an original version of wormholes was later dismissed because they are not traversable in nature, i.e., its throat opens and closes so quickly.

Making a stable WH necessitates the addition of an unusual ingredient that prevent the WH throat from closing, which researchers refer to as "exotic" matter. Visser et al. (2003) determined the amount of exotic matter of a wormhole determined by "volume integral quantifier". This exotic matter violates the known energy conditions. In 1988, Morris and Thorne (1988) introduced some conditions for traversable WH. Furthermore, this exotic matter with negative energy density satisfy the

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ECOCRITICISM IN LITERARY CREATIONS WITH SPECIAL REFERENCE TO KĀLIDĀSA'S MEGHADŪTA

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Abstract :
Literature is the medium to reflect the current problems of society. Ecocriticism alerts the persons of the society through literary works to sensitize with all problems. The word "ecocriticism" is the combination of two words – eco and criticism. Eco means earth, the whole universe and criticism mans study. So ecocriticism means study of nature. It widens and gives more comprehensive approach to the study of literature. Eco system is an important environmental aspect which lays down the close relation between plants and living creatures. An observation of the literary texts shows that poets were staunch advocates of nature. In their revelation they gave the impression that nature is the life of all creatures. Kālidāsa's Meghadūta has specially referred here to evaluate it as an eco-critical text. An attempt has been made here in this paper to throw fresh light on the eco-critical ideas of the poets and their literary creations.

Key words : Ecology, Eco-criticism, Global-warming, Animal studies.

Introduction :
Since prehistory, literature and the arts have been drawn to portrayals of physical environments and human-environment interactions. The modern environmentalist movement as it emerged first in the late-nineteenth century and, in its more recent incarnation, in the 1960s, gave rise to a rich array of fictional and nonfictional writings concerned with humans changing relationship to the natural world. Only since the early 1990s, however, has the long-standing interest of literature studies in these matters generated the initiative most commonly known as "ecociritcism", an eclectic and loosely coordinated movement whose contributions thus far have been most visible within its home discipline of literature but whose interests and alliances extend across various art – forms and media. In such areas as the study of narrative and image, ecociriticism converges with its sister disciplines in the humanities : environmental anthropology, environmental history, and environmental philosophy. In the first two sections, we begin with a brief overview of the nature, significance and evolution of literature – environmental studies.

Methodology :
Some depictions of the journey of the environmental concept of the poets of Sanskrit literary works through the natural elements have been analyzed. Some general ideas related to the subject recorded in the Sanskrit texts are examined to come to the conclusion. For supporting the views Sanskrit and others works related to environmental science are used for the study.

Depictions

(I)

Literature and environment studies – commonly called "ecocirticism" or 'environmental criticism' in analogy to the more general term literary criticism – comprise an eclectic, pluriform and cross-disciplinary initiative that aims to explore the environmental dimensions of literature and other creative media in a spirit of environmental concern not limited to any one method or commitment.

Ecocriticism begins from the conviction that the arts of imagination and the study thereof – by virtue of their grasp of the power of word, story and image to reinforce, enliven, and direct environmental concern – can contribute significantly to the understanding of environmental problems : the multiple forms of ecodegradation that afflict planet Earth today. In this, ecocriticism concurs with other branches of the environmental humanities – ethics, history, religious studies, anthropology, humanistic geography – in holding that environmental phenomena must be comprehended and that today's burgeoning array of environmental concerns must be addressed qualitatively as well as quantitatively.

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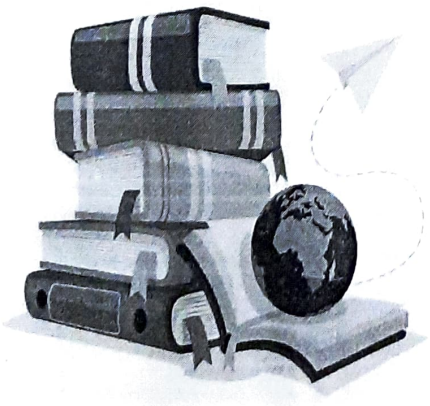

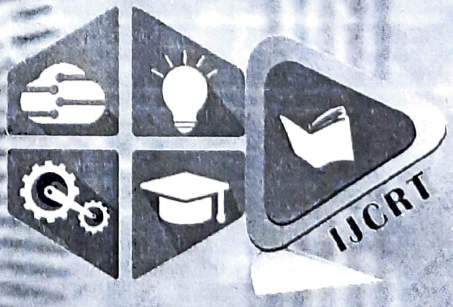

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Empowering women through alternative livelihoods in the coastal areas of the sundrbans, west bengal, india.

Arabindu Sardar,
Assistant Professor in History,
Sarat Centenary College, Dhaniakhali, Hooghly &
Ph.D Research Scholar of The University of Burdwan.

Abstract:

Women comprise over half of the world's population and play an important role for the well-being of their family members and sustainable development of their communities and nations, and also for the maintenance of the Earth's eco-systems, bio-diversity, and natural resources. United Nations Environment Programmers hope that women and their psychological affinity towards the environment will inspire the future of environmental and sustainable development of community towards the better understanding of the importance of gender and integration of gender perspectives across the world. There is a fundamental difference between the attitude of men and that of women towards Nature and natural resources. Throughout history, men used to look natural resources as commercial entities or income generating tools, while women have tended it to see the environment as a resource supporting of their basic needs. As we know very well that, women usually collect the dead branches, dry-leaves as fuel for cooking rather than cutting the trees. Ecological conditions are gradually deteriorating in the Sundarbans, being associated with poverty, unlimited and unplanned settlements leading to the environmental degradation. Production and processing of biomass, agriculture, and forestry and village crafts based on biomass as raw materials are also the biggest sources of employment in the Sundarbans. Since the Sundarbans is an underdevelopment region, women are ceaselessly facing additional barriers to empower themselves due to the viable presence of the issues like- male dominated society, illiteracy, lack of economic independence and conservative social structure with religious obscurantist practices and beliefs. I would discuss alternative livelihoods option of women in the Sundarbans.

Key words: Sundarbans, livelihood, migration, alternative women.

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সম্পাদনা

নাজিবুল ইসলাম মণ্ডল

সমকালের জিয়নকাঠি ত্রৈমাসিক সাহিত্য পত্রিকা

অখণ্ড সুন্দরবন কথা-১

(ভারত-বাংলাদেশ)

জুলাই - ডিসেম্বর ২০২২
(যুগ্ম সংখ্যা)

সম্পাদক
নাজিবুল ইসলাম মণ্ডল

কার্যনির্বাহী সম্পাদক
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(সমকালের জিনয়কাঠি স্মারক সম্মাননা - ২০২২)

Environmental Refugees : A New identity in the Indian Sundarbans

Arabindu Sardar

There are many fundamental differences between these two terms 'Refugees' and 'Environmental Refugees'. The traditional concept of 'Refugee' or *'Udbastu'* means a person who has been forced to leave their homeland or settlements due to war, persecution, ethno cleansing, community riots or natural disaster. India has a long experience and tradition of providing protection and rehabilitation to the refugees. In a broader sense, environmental refugees are those people who have been displaced as a result of natural disaster and environmental changes. The natural disaster refers to two types of natural calamities, which are responsible for forced migration of large number of people of the Sundarbans. The number of displaced people in the Sundarbans is increasing day by day for various reasons. Sudden on-set events are floods, cyclones, and land erosion and Slow on-set events are coastal erosion, Sea-level rise, Salt water intrusion, rising temperature and changing rainfall patterns and drought. In 1964, the first environmental refugees in the Sundarbans migrated from Lohachura and Bedford islands to different colonies of the Sagar Island.

The Sundarbans, world's largest active delta, are unique in its nature. Its own estuarine system, intricate coastlines, clusters of smaller deltas, innumerable islands, criss-crossed by numerous distributaries, provides great diversity to the eco-system. William Wilson Hunter portrayed the Sundarbans as an area 'a sort of drowned land, covered with jangle, smitten by malaria, and infested by wild beasts; broken up by swamps, intersected by a thousand river channels and maritime backwaters but gradually dotted, as the traveler recedes from the seaboard, with the clearing and patches of rice land.'[1]. The area, as he observed, has a vast alluvial plain, where the process of land formation is still ongoing.

The history of reclaiming of the Sundarban forests started after East India Company's rise to power. The forests extended to the contiguity of Calcutta. Early attempts at reclamation in the eighteenth century were unsuccessful. But in later times the landlords from Kolkata and its

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মূল্য : ৮০০ টাকা

India-Bangladesh Maritime Boundary and the Problem of Dwellers of the Indian Sundarbans

Arabindu Sardar
Assistant Professor, Department of History
Sarat Centenary College

Abstract: India and Bangladesh are closely attached in both historical and geographical contexts. History is the first and leading determinant of the foreign policy of Bangladesh towards India. Geologically, India and Bangladesh co-occupy approximately 180 k.m of maritime borderline. During the aftermath of the Bholo cyclone in 1971, a small island (New Moore/South Talpatti) unexpectedly emerged in the Ganges Delta region of the Bay of Bengal. The island emerged at the mouth of the Hariabhanga River, which is the border between Bangladesh and India; its geological location prompted both nations to claim the island under their jurisdiction, which is known as the Indo-Bangladesh maritime boundary dispute. Although Bangladesh went in for arbitration over the delimitation of maritime boundary under the United Nations Convention on Law of Sea (UNCLOS).The much-awaited verdict on the dispute regarding the delimitation of the maritime boundary between India and Bangladesh on 7th july,2014.It is possible, overcoming a 40 year-old maritime boundary dispute? Because The Government(Central & State), Border Security Forces(BSF), Coastal Security Guard as well as dwellers of the Sundarban faces a number of Threats and Challenges that originate from this dispute border line, which are mainly sub-conventional in nature. These threats and challenges can be categorized into various types-: maritime terrorism, piracy and armed robbery, smuggling and trafficking, infiltration, illegal migration and refugee. This paper focuses mainly an overview of the dwellers, which are frequently attacked by pirates. For this reason, the study emphasizes impact on the poor and marginalized people of the effected area. The pirates/gangs attack fishermen, hijack their boats, hold them hostage for months, demand ransoms, rob them of their catch and personal belongings and sometimes kill them.

Keywords: India, Bangladesh, Maritime boundary, Sundarban, Piracy, Dwellers, Migration.

India and Bangladesh not only share their border on land but also their coastline. India itself has a long coastline of 7,417 k.m among the eight

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মূল্য : ৬০০ (ছয় শত) টাকা

Impact of Globalization on the Sundarbans folk Culture : A Study

Arabindu Sardar

Culture is the embodiment of the traditions of a larger human society, but the folk culture is a variation in the behavioural aspects of the people who act in various socio-economic conditions in any natural territory of a country. The elements of folk culture of different districts of Bengal are different. The Sundarbans has its own folk cultural features. Folk culture is very ancient and elements of folk's culture are full of diversities and colours. Notable among the elements of folk's culture are rhymes, proverbs, riddles, everyday songs, folk tales, storytelling, puppet shows and fairy tales of various religions and unique variations in costumes, cooking, sports etc.

Primitive nomadic people one day settled in one place for their own needs and gradually developed new kind of social structures and virtually refined their minds. Culture is the ultimate form of sophistication towards human progress. The term 'culture' stands for the sum total of human behaviour, verbal and nonverbal and its material and non-material aspects. The word 'culture' connotes different meanings in different situations. Etymologic ally, the word is linked with words like 'cultivate', 'cultivation' and 'agriculture'. In seventeenth century, its meaning was applied to human development. This metamorphical meaning was further developed in eighteenth century to give rise to a general term. In Germany, the word was started to be spelt as 'culture'. But soon it was converted to 'kultur'. During nineteenth and twentieth century, the term became very distinct and got entangled with different meanings in different spheres.

Reforms and Culture are on opposite sides of the same coin. Culture is not a close reservoir, culture is a flowing river and roaring wave whose success is conjoins with the sea. The journey of the folk culture from small to large and the national culture has been formed by the combination of three epochs- ancient, medieval and modern ages. National culture is divided into two parts- one is the culture of the elite or modern educated community and another culture is the

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शव्दतत्त्वविषये आलोचना प्राचीनभारते वैदिकयुगतः प्रचलिता। वेदस्य विविधसूक्ते, व्राह्मणग्रन्थसमूहे, व्याकरणादि वेदाङ्गे, प्रातिशाख्ये, वैदिके च अवैदिके दार्शनिकप्रस्थाने शव्दत्त्वस्य विविधविषयं स्वीकृत्य वेचित्र्यपूर्णालोचनायाः प्रभूतनिदर्शनं आधुनिकभाषातत्त्वविदसम्प्रये विस्मयमिश्रितं प्रशस्तिं लभते। शव्दविद्यायाः सुदीर्घे इतिहासे श्रेष्ठासनं लव्धवान् महाभाष्यकारपतञ्जलिः ।पाणिनिकात्यायनव्याड्यादिनां पूर्वाचार्यानां ग्रन्थसमुहानां आश्रयकृतेन आर्चायेन पतञ्जलिना तस्य शव्दतत्त्वविषयकः अतिगम्भीरः दुरुहदार्शनिकविचारमण्डितः 'महाभाष्यम्' इति ग्रन्थः विरचितः । शव्दतत्त्वस्फोटविषये समीक्षा एव अस्य निवन्धस्य विषयः। आलोचनापूर्वे उक्तं आलोच्य N विशदरूपे समाधातुम - सास्नालाङ्गलककुदखुरविषाणेत्यादीनि द्रवाणि गोशव्दस्य वाच्यानि न भवन्ति। यदि तथा स्यात् तर्हि 'गोः सास्नालाङ्गुलादि' इति भेदाग्राही अनुभवसिद्धः व्यावहारः असम्भवः एव। अतः द्रवं गोशव्दस्यार्थः न । एवं गोः गमनशयनादि क्रियापि गोशव्दस्य अर्थः न । अन्यथा गो गमनशयनादि भेदप्रतियोगि अर्थ न स्यात्। अतः गोशव्दः क्रियावाचकः न। पुनः श्वेतकृष्णलोहितादि गुणाः गो शव्दस्य अभिधेयः न। यतो हि गोः श्वेतकृष्णादि गुणरूपे प्रसिद्धत्वात् उभयोः भेदः अनुभावसिद्धः। तथैव गोत्वंरूपं सामान्यं वा जातिः 'गो' शव्दस्यार्थः नास्ति। यतो गोः गोत्वम् असाधारणधर्मं एवं सर्वसिद्धव्यावहारः उभयोः भेदस्य प्रयोजकः। यदि सामान्यमेव गोशव्दस्यार्थः तर्हि गोत्वमेव गौ इति व्यवहार स्यात्। एवं द्रव्यं वा गुन वा क्रिया वा 'गो' शव्दस्यार्थः तर्हि सास्नादि गौः, श्वेतकृष्णादि गौः, गमनादि गौः इति व्यावहारः स्यात्।

परन्तु एवं व्यावहारः कुत्रापि नास्ति। गौः द्रवस्य वाचकः न, अतः सास्नादि गोशव्दस्य वाच्यः न।अतः द्रव्यगुणक्रियासामान्यम् किमपि पृथकरुपे शव्दस्यार्थः न भवति। भाष्यकारस्य एवं गोशव्दस्यार्थः स्वीकारे आशङ्का भवेत्येव । अतः शङ्कायाः समाधायन् आह महामुनिपतञ्जलिः-

' येनोच्चारितेन सास्नालाङ्गूलककुदखुरविषाणिनां संप्रत्ययो भवति स शव्दः'।[1]

अभिव्यङ्गं स्फोटः एव शव्दः इति ध्वनितः। स्फोटाख्यः शव्दः एव अर्थस्य वाचकः। स्फोटः नित्यशव्दः, स अनादिनिधनः अर्थात् उत्पत्तिविनाशरहितः। स्फोटः स्वप्रकाशः च सर्वव्यापि। वैयाकरणमतानुसारेण स्फोटोख्यः शव्द एव जगतः स्रष्टा। जगऽस्रष्टा निरावयवः अविकृतस्वरूपः परानिष्टितः भूत्वा जगऽरूपं भूतवान्। एष एव शव्दव्रह्मनः विवर्त। तथैव वाक्यपदीयकारः -

"अनादिनिधनं व्रह्म शव्दतत्त्वं यदक्षरम् ।

विवर्ततेऽर्थभावेन प्रक्रिया जगतो यतः ।।[2] इति

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[1] दण्डिस्वामी, दामोदर-आश्रम, पतञ्जल महाभाष्य (पस्पशाह्निक), १४१७ वङ्गाव्द, पृः १४

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Research Article

Reversible Electrochromic/Electrofluorochromic Dual Switching in Zn(II)-Based Metallo-Supramolecular Polymer Films

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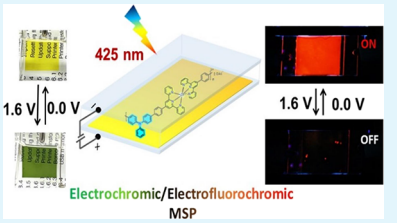
ABSTRACT: The introduction of novel materials with multifunctional chromogenic properties, such as electrochromic/electrofluorochromic (EC/EFC) properties, has recently attracted prospective interest in the development of various optoelectronic devices and smart windows. In this study, a novel Zn(II)-based metallo-supramolecular polymer (**polyZn**) has been developed as an ON/OFF switchable EFC application with prominent EC behavior. In this regard, the polymeric chain of **polyZn** was first synthesized by 1:1 complexation in a zigzag manner with Zn(II) ions at the metal center and 4,4′-[bis(2,2′:6′,2″-terpyridinyl)-benzene]triphenylamine ($L_{TPY\text{-}TPA}$) as the redox-active ditopic ligand. The **polyZn** exhibits excellent solubility in organic solvents and can form a very good uniform thin film on an indium tin oxide/glass substrate by spin-coating. In a neutral state, transparent **polyZn** exhibits a bright yellow color to the naked eye (absorption at ∼325 nm). The electroactive triphenylamine (TPA) core of $L_{TPA\text{-}TPY}$, however, undergoes reversible single-electron oxidation when a positive bias of +1.6 V vs Ag/Ag^+ is applied, generating radical cations ($TPA \leftrightarrow TPA^{\bullet+}$) with a significant drop in transparency (77%). A noticeable chromic shift in the hue of the film from brilliant yellow to green was observed with the appearance of a near-infrared absorption band at ∼897 nm with a tail of 1300−1600 nm. Interestingly, in addition to this EC phenomenon, the fabricated solid-state **polyZn** film exhibits intense, high-contrast reddish-orange photoluminescence with λ_{em} = 650 nm, which is significantly desired as a molecular probe for bioimaging. Both the TPA core and the redox-inactive Zn(II)-terpyridine core emit orange-red photoluminescence in **polyZn**, which is significantly quenched upon the oxidation of the film and is re-emitted at 0.0 V vs Ag/Ag^+. This ON/OFF EFC transition was sustained for several cycles. This study should motivate to design and create distinctive new unique materials with combined EC/EFC behavior for the fabrication of optoelectronic devices by combining a metal-fluorescent core with a redox-active spacer.



KEYWORDS: *metallo-supramolecular polymer, electrofluorochromism, electrochromism, redox-inactive Zn-fluorescent core, optoelectronic device, dual-switching display, orange-red photoluminescence*

1. INTRODUCTION

Reversible bistable switchable materials with electrochemical inputs and optical absorption or emission outputs have received significant attention as information displays, optical memory, sensors, smart windows, etc.[1−6] In electrochromic (EC) changes, the optical output leads to a change in the chromic shift inside the material, resulting in a color change in the visible/near-infrared (NIR)/vis−NIR region.[7−10] However, in electrofluorochromic (EFC) behavior, the optical output results in a change in the photoluminescence (PL) behavior of the material.[11−13] Although modern technology has made significant progress in the EC or EFC technology individually,[8,13] the development of a unified device with both EC and EFC characteristics is highly desirable and beneficial for a wide range of applications in display technology, as both the absorption or emission output can be modulated with low *dc* bias applications.[14,15] In addition, the absorption or emission in the NIR (750−2500 nm) region is more useful because red NIR emission is highly recommended for bioimaging[16] and other military applications,[17] while NIR solar absorption can reduce solar heat gain to reduce the building-energy consuming cost for indoor heating/cooling.[18−20]

Various kinds of materials have been considered for EFC applications, such as organic small molecules, lanthanide-based complexes, aryl amine-appended conjugated polymers, inorganic crystals, and polymeric gels.[4,21−25] Meanwhile, a wide range of materials, including transition metal oxides, small organic molecules and conjugated polymers, transition metal complexes and polymers, organic−inorganic hybrid nanostructures, and plasmonic nanocrystals, exhibit variable electrochromism.[26−37] However, to realize a unified EC/EFC device, material design is critical so that the chromophore can modify

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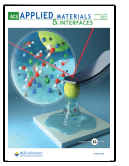
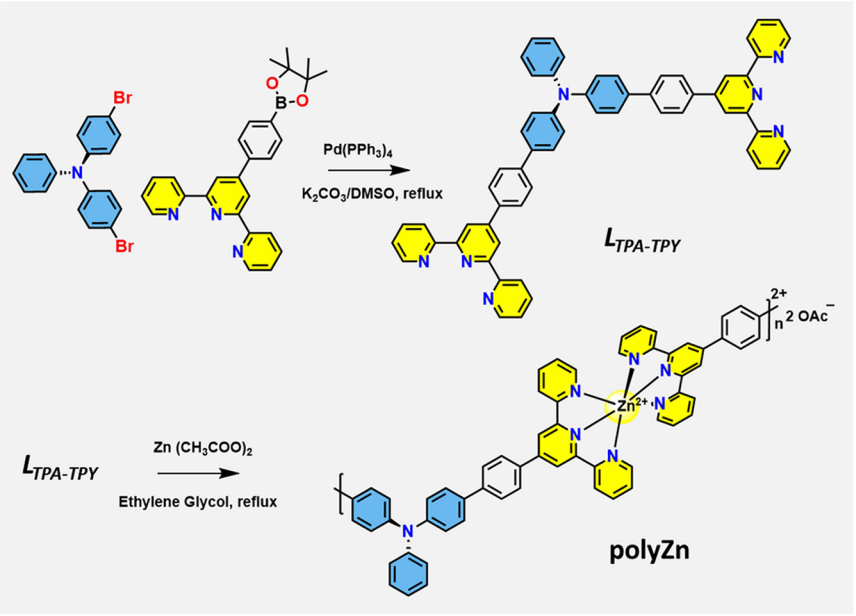


Scheme 1. Chemical Structure and Synthesis of polyZn



its optical fluorescence, in line with its redox state, and alter its absorption spectra to produce a distinct hue. According to previous literature reviews, most of the reported EC/EFC active molecules are small organic molecules such as photoredox-active thiophene or TPA derivatives, hydrogels of substituted thiazolothiazole derivatives, and carboxylic acid-substituted terpyridine.[38−49] Wang et al. introduced an interesting approach for creating dual EC/EFC functionality in a device composed of WO_3/FTO and copper nanocluster/FTO, where WO_3 served as an EC layer and the copper nanocluster provided photoinduced luminescence.[47] Most recently, Halder et al. reported a thiazolothiazole-based conjugated polymer as an effective candidate with EC/EFC characteristics.[50] Corrente et al. also reported benzothiadiazole-arylamine mixed-valence compounds exhibiting EC/EFC dual functions.[51]

However, our group is interested in metallo-supramolecular polymers (MSPs), as they are considered an advanced class of materials for modern device technology.[52] Because of their high solubility and good film-forming ability, they offer excellent film processability for large-area printing (spray/spin technique) with good optical contrast and uniformity. These categories of materials exhibit excellent EC behavior. In our few previous results, we have reported the visible-range EC properties of Fe(II)/Ru(II)/Co(II)-based nonluminescent MSPs, where the redox metal center is responsible for reversible optical color change.[53−57] Furthermore, we have reported luminescent MSPs with a redox-silent Zn(II)/Cd(II)-based metal center.[58,59] Many photoluminescent Zn complexes have been reported thus far for interdisciplinary applications.[60−62] Recently, we have reported dual-redox MSPs composed of TPA-based redox ditopic ligand and Fe(II) or Ru(II) metal center.[53] Therefore, by taking advantage of both the redox activity and emissive property of the TPA-based ligand[49,53,63] with the unique and intense luminescence behavior of the Zn(II)-*tpy*-based polymer,[58,59,62] and fulfilling the large area printing demand for real device/display fabrication we have developed a novel Zn(II)-based MSP, exhibiting reversible ON/OFF EFC properties with prominent electrochromic switching for long cycle performance. To the best of our knowledge, this is the first work on Zn(II)-based MSP offering reversible dual switching with transparent to NIR EC and reddish-orange to dark EFC.

2. EXPERIMENTAL SECTION

2.1. Materials. Tetrabutylammonium perchlorate (TBAP, 98% purity), 4,4′ dibromotriphenylamine, and poly(methyl methacrylate) [PMMA, average MW ~ 350,000 by GPC] were purchased from TCI chemicals, Japan. Zinc acetate (99.99%) and tetrakis-(triphenylphosphine)palladium(0) ([$Pd(PPh_3)_4$]) (99%) were obtained from Sigma-Aldrich. Propylene carbonates (PC), potassium carbonate (K_2CO_3), acetonitrile (MeCN), nickel hexacyanoferrate (NiHCF), ethylene glycol, and other common organic solvents were supplied by Wako Chemicals Japan.

2.2. Synthesis of 4,4′-[Bis(2,2′:6′,2″-terpyridinyl)benzene]-triphenylamine ($L_{TPA\text{-}TPY}$). The ditopic ligand $L_{TPA\text{-}TPY}$ was synthesized by following the previous procedure.[54] In brief, 4,4′-dibromotriphenylamine (465 mg, 1.15 mmol), 4′-(4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl)-2,2′:6′,2″-terpyridine (870 mg, 2 mmol), $Pd(PPh_3)_4$ (115 mg, ~10 mol %), and K_2CO_3 (1.38 g, 10 mmol) in deoxygenated dimethyl sulfoxide (20 mL)/water (2 mL) were taken in a two-neck round-bottom flux and heated to reflux at 110 °C for 48 h under a N_2 atmosphere. After the reaction mixture was cooled to normal temperature, the product was extracted using a CH_2Cl_2/H_2O mixture. The pale-yellow crude product was purified by column chromatography (basic alumina; CH_2Cl_2/MeOH 95:5) with 70% yield. The proton nuclear magnetic resonance (^{1}H NMR) and electrospray ionization mass spectrometry (ESI−MS) spectra for $L_{TPA\text{-}TPY}$ are shown in Figures S1 and S2, respectively (Supporting Information). ^{1}H NMR: (400 MHz, CD_2Cl_2) δ (ppm): 8.81 (s, 4H), 8.72−8.67 (m, 8H), 7.98 (d, J = 8.7 Hz, 4H), 7.90 (td, J = 7.5, 1.7 Hz, 4H), 7.77 (d, J = 17.6 Hz, 4H), 7.62 (d, J = 8.2 Hz, 4H), 7.38−7.30 (m, 6H), 7.20 (t, J = 7.5 Hz, 6H), 7.09 (t, J = 7.3 Hz, 1H). ^{13}C NMR: (CD_2Cl_2) δ 156.0, 155.9, 149.6, 149.1, 147.4, 141.3, 137.0, 136.8, 134.4, 129.5, 128.9, 127.8, 127.7, 127.1, 125.0, 124.2, 124.0, 123.6, 121.2, and 118.5. ESI-TOF-MS ($CHCl_3$/MeOH, 1:1 v/v) m/z: found 860.3 (100%), 861.3 (65%), 862.3 (20%) for $[M + H]^+$ (calculated M = 859.3 for $C_{60}H_{41}N_7$).

2.3. Synthesis of the Polymer. The linear **polyZn** was obtained by 1:1 complexation polymerization of the ditopic ligand ($L_{TPY\text{-}TPA}$) and Zn^{2+} ions (Scheme 1). In brief, $L_{TPY\text{-}TPA}$ (200 mg, 0.23 mmol) and zinc acetate (42.7 mg, 0.23 mmol) were taken in a two-neck RB

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flux and refluxed in ethylene glycol for 24 h. The bright orange-yellow reaction mixture was then cooled to room temperature, and ethylene glycol was removed under reduced pressure. Finally, the pale-yellow solid was washed with dichloromethane three or four times to remove the unreacted ligand, and a red solid was obtained and dried in a vacuum for an additional overnight period (yield: 95%). The synthesized **polyZn** is fully soluble in methanol or ethanol, but insoluble in acetonitrile.

2.4. Deposition of the polyZn Thin Film. The polymer thin film on the indium tin oxide (ITO) glass substrate was deposited by using the spin-coating technique. An ink-solution of **polyZn** (conc. 10 mg/mL) was prepared by dissolving solid polymer powder in methanol and filtering the solution with a micro PVDF microsyringe filter (0.45 μm) to remove small insoluble particles. Finally, the yellow polymer ink was slowly coated on the ITO glass by spin-coating and dried in a vacuum oven (50 °C).

2.5. Fabrication of a Quasi-Solid-State Device. The fabrication of a quasi-solid-state device (QSSD) of **polyZn** was performed by sandwiching two electrodes: **polyZn**/ITO working electrode and NiHFC/ITO counter electrode with a polymer to obtain an electrolyte. (i) First, a transparent thin electrolyte gel film was prepared by mixing TBAP, PC, and PMMA in an 8/46/46 (w/w) ratio, followed by warming at 95 °C and 40% relative humidity between two glass substrates. (ii) The ITO glass-coated polymer was washed with a 0.1 M TBAP/CH_2Cl_2 solution to remove the low molecular weight part of the polymer that served as a working electrode. (iii) NiHCF-coated ITO glass was used as a counter electrode prepared using the spin-coating technique. (iv) The working and counter electrodes were placed in a sandwich configuration separated by the transparent gel film.

3. RESULTS AND DISCUSSION

Scheme 1 depicts the structure and synthetic protocol of **polyZn** by bulk complexation polymerization of the redox-active TPA core-based ditopic terpyridine (*tpy*) ligand and $Zn(OAc)_2$. The coordinating nature of the *tpy* site binds Zn in an octahedral geometry with corresponding two counter acetate ions (OAc^-) balancing the charge of the polymer backbone.[60] The structure and purity of the ligand were confirmed by NMR and mass spectra, as shown in Figures S1 and S2 in the Supporting Information.

To evaluate the complexation stoichiometry of $L_{TPA\text{-}TPY}$ with Zn^{2+}, we performed UV−vis spectral titration by the successive addition of a Zn^{2+} solution to $L_{TPA\text{-}TPY}$ (Figure 1). The ligand absorption spectra in CH_2Cl_2 reveal two distinct absorption bands in the UV region, 279 and 368 nm, corresponding to $\pi-\pi^*$ of the TPA unit and intramolecular charge transfer (ICT) transitions, respectively, and thus appeared as a colorless solution. Upon the addition of a $Zn(BF_4)_2$ methanolic solution, two new peaks gradually appear at λ_{max} = 326 and 431 nm. These two peaks, which are coordinated by $Zn^{2+}$to the terpyridine group, may result from the ligand-to-ligand charge transfer transition (LLCT) and intramolecular charge transfer (ICT). The intraligand charge transfer transition (ILCT) is responsible for the complexes' bands around 320 nm, and the TPA moiety's $\pi-\pi^*$ transition is responsible for the bands around 280 nm.[62] The complexation ratio was calculated to be 1:1 as both peak intensities increased until they reached saturation with the addition of 1 equiv of metal to 1 equiv of $L_{TPA\text{-}TPY}$ (inset, Figure 1a). Furthermore, a coordinative interaction in the polymer was established by ^1H NMR studies, as shown in Figure S3. The down-shifting and peak-broadening of the corresponding proton peaks of $L_{TPA\text{-}TPY}$ in the polymer backbone imply metal chelation and polymer chain formation.[62]

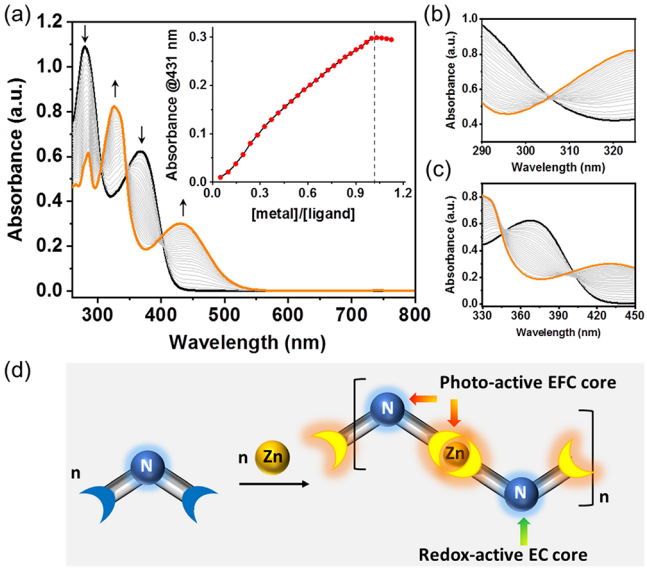

Figure 1. UV−vis complexometric titration of $L_{TPA\text{-}TPY}$ to Zn^{2+} metal ions. (a) UV−vis spectral changes. (b, c) Isosbestic points at 306, 348, and 402 nm due to the addition of $Zn(BF_4)_2$ solution (MeOH, $c = 5 \times 10^{-4}$ M) to ligand solution (CH_2Cl_2, $c = 10^{-5}$ M). (d) Schematic representation of the zigzag conformation of polymer formation.

The optical absorption and emission properties of the **polyZn** film in the solid state were measured by UV−vis and PL studies, respectively, as shown in Figure 2a. Prior to

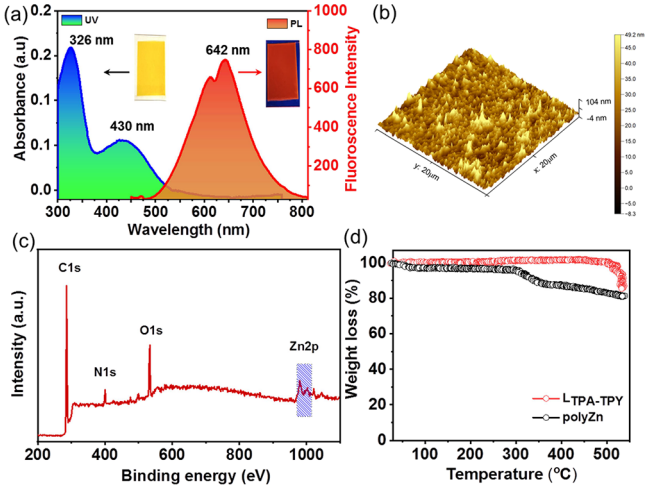

Figure 2. (a) Absorption and emission spectrum (excited at 425 nm) of **polyZn** film on ITO glass; the inset image represents the visible (yellow) and under UV light (orange color, 365 nm). (b) AFM topographic image and thickness of the **polyZn** thin film. (c) XPS and (d) TGA studies of the ligand and polymer at 25−550 °C under an N_2 atmosphere.

measurement, a bare ITO glass was used as a blank reference for both studies. The **polyZn** thin film on the ITO glass exhibited two similar transitions, as determined by UV−vis titration analysis, at $\lambda_{max} \sim$ 326 and 430 nm for $\pi-\pi^*$ and $n-\pi^*$ transitions, respectively, revealing a yellow film (inset image, Figure 2a, left). The UV−vis spectrum differences between ligand $Zn(BF_4)_2$ and complex (polyZn) have been demonstrated in Figure S4a (SI). The film exhibited intense bright orange fluorescence with $\lambda_{max} \sim$ 642 nm when excited

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with a UV light source of λ_{max} ~ 425 nm (inset image, Figure 2a, right).

The morphology and surface topology of the polymer film were examined by atomic force microscopy (AFM) (Figure 2b), revealing a smooth surface with spherical dot-like aggregation-assembled morphology. Furthermore, the fabricated thin film was ~100 nm thick according to the AFM measurement. Additionally, the SEM study reveals aggregated-assembled like network morphology shown in Figure S5 (SI). The **polyZn** sample was further characterized by X-ray photoelectron spectroscopy (XPS) (Figure 2c). The characteristic elemental peaks detected in the wide-scan survey spectra at 285, 400, 534, and 981 eV correspond to C 1s, N 1s, O 1s, and Zn 2p, respectively,[59,61] indicating the presence of the constituent elements in the polymer backbone. The atomic percentage ratio of N (ligand part) to Zn (metal center) qualitatively calculated by considering the area under the curve of N 1s and Zn 2p core-level spectra was 7.8:1, which is considered close to the ideal value (N/Zn = 7:1), revealing a hexacoordinated Zn environment. Thermograms confirmed that **polyZn** has excellent thermal stability up to 550 °C (Figure 2d). The first small degradation (~10%) at 320 °C implies for decomplexation, with further increase of temperature up to 550 °C polymer showing retention ~80% (i,e ~ 20% degradation).

The electrochemical performance of **polyZn** was tested by a three-electrode cyclic voltammetry (CV) study in a nonaqueous (0.1 M TBAP/MeCN) electrolyte at a scan rate of 20 mV/s, where ITO-coated **polyZn** served as the working electrode, freshly prepared Ag/Ag^+ as the reference electrode, and Pt-wire acted as the counter electrode, as shown in Figure 3a. The voltammogram showed excellent reversibility of the

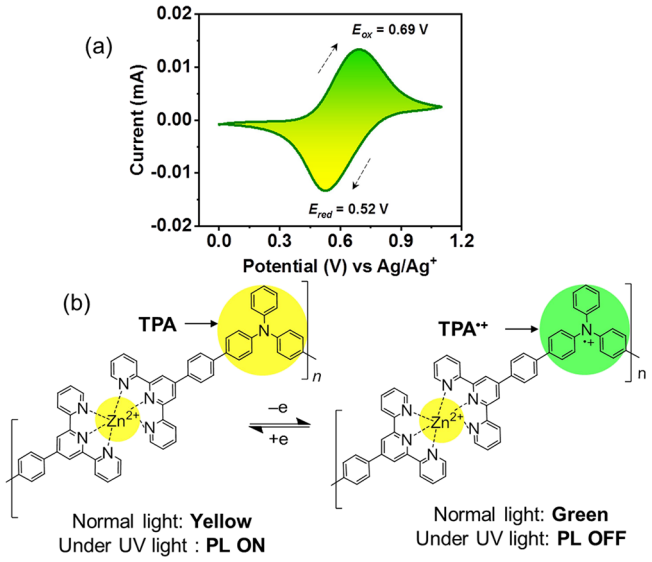

Figure 3. (a) CV study of the polymer film in the nonaqueous electrolyte at a scan speed of 20 mV/s. (b) Corresponding chemical changes in the polymer chain upon oxidation/reduction.

polymer with $E^0_{1/2}$ = 0.605 V (vs Ag/Ag^+). The redox signature with a forward oxidation peak at 0.69 V (vs Ag/Ag^+) and backward reduction at 0.52 V (vs Ag/Ag^+) indicates the reversible transformation of TPA and polaronic TPA ($TPA/TPA^{\bullet+}$).[63−65] We have also performed CV for the ligand and $Zn(BF_4)_2$ compared with **polyZn** in Figure S4b (SI). The corresponding chemical changes of the polymer backbone are shown in Figure 3b. Furthermore, the scan-rate-dependent study of **polyZn** showed a linear increase in the peak current with the square root of the scan rate (Figure S6), implying a diffusion control redox mechanism at the polymer−electrolyte interface.

3.1. Electrochromic Study of polyZn. The EC performance of the polymer was tested in a three-electrode solution-state electrochemical setup by taking the **polyZn**/ITO glass as a working electrode, Pt wire as a counter electrode, and nonaqueous Ag/Ag^+ as a reference electrode in a 0.1 M TBAP/MeCN electrolyte. In the normal state, the film exhibited high transparency of ~90% in the vis−NIR region. However, with the slow increase in the potential to 0.7 V vs Ag/Ag^+, the absorption spectra showed the slow appearance of a broad absorption band at 1300−1600 nm with a decrease in the peak intensity at 427 nm. With a further increase in the bias to 1.6 V vs Ag/Ag^+, the hump disappears and a new NIR absorption band appears at ~897 nm, as shown in Figure 4a.

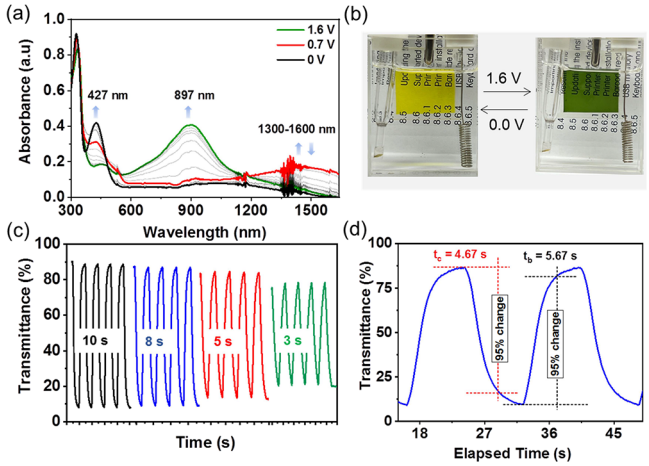

Figure 4. (a) Spectro-electrochemical performance of **polyZn** was tested by a three-electrode system in 0.1 M TBAP/MeCN. (b) Photograph of the electrochromic color change of the **polyZn** film. (c) Dynamic changes in the transmittance of **polyZn** upon switching the potential between 0 and 1.6 V (vs Ag/Ag^+) with different pulse widths of 10, 8, 5, and 3 s. Transmittance was monitored at ~897 nm. (d) Switching response of the film in NIR region.

As the redox potential between TPA and $TPA^{\bullet+}$ is about 0.6 V vs Ag/Ag^+, as shown in Figure 3a, the TPA core is not completely oxidized at 0.7 V vs Ag/Ag^+. Thus, it is considered that the NIR absorption at 1300−1600 nm at 0.7 V vs Ag/Ag^+ is attributed to a polaron band formation by the partially oxidized TPA cores. It can also be explained as a charge transfer band between the unoxidized TPA and the oxidized TPA ($TPA^{\bullet+}$) in the polymer chain. Then, all TPA cores are oxidized to $TPA^{\bullet+}$ at 1.6 V vs Ag/Ag^+. So, the absorption generated at 900 nm at 1.6 V is caused by the bipolaron formation in the polymer backbone,[50,64] which resulted in a strong chromic transition from yellow to green and significant decay in transmittance, as shown in the photograph (Figure 4b). The film generated the original color once the voltage is reversed to the normal state.

After that, to assess the EC stability of the film, the newly appeared transmittance of the film at the corresponding wavelength was checked by directly switching the potential between 0.0 and 1.6 V vs Ag/Ag^+ with different time laps

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(Figure 4c). The data revealed that the transmittance change of the film between its neutral and oxidized states was almost the same with 10 and 8s elapsed times. However, with fast switching of potentials, the film was unable to release or gain electrons quickly to obtain color and bleach, and thus, the transmittance change was reduced. Nevertheless, to assess the EC stability of the film, the potential was switched with minimum 8s interval monitoring at ~897 nm. The bleaching time (t_b) and coloring time (t_c) were calculated to be 5.67 and 4.67 s, respectively, by considering the time required for a 95% change in transmittance, as shown in Figure 4d. Importantly, device fabrication is crucial for real utilization.[66−71] Additionally, the EC properties of **polyZn** in the device state are shown in Figure S7 (SI). The fabricated device exhibited excellent EC stability with a loss of transmittance (ΔT) of 12% after 5000 s, shown in Figure S7c (SI).

3.2. Electrofluorochromic Study of polyZn. Finally, the in situ electrofluorochromic behavior of the device was checked by expositing the fabricated **polyZn** QSSD at a UV light source with an excitation wavelength of 425 nm. A schematic view of the sandwiched fabricated device is shown in Figure 5a. The details of the procedure of the fabrication

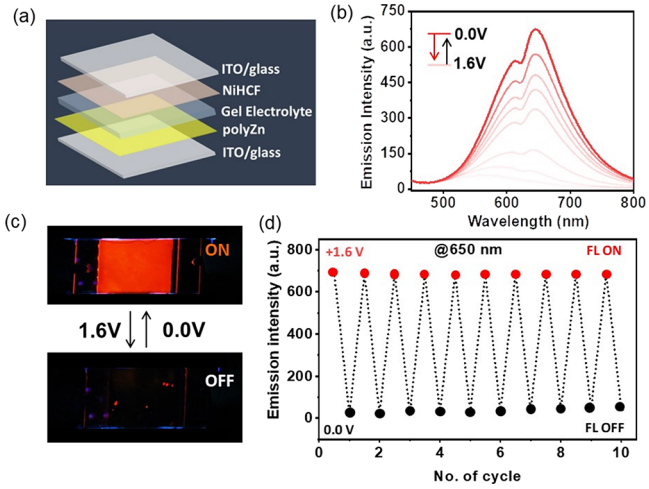

Figure 5. (a) Schematic presentation of the fabricated **polyZn** QSSD. (b) Emission intensity (λ_{ex} = 425 nm) of device changes with different applied potentials (vs NiHCF). (c) Corresponding photograph of ON/OFF luminescence of the device. (d) EFC ON/OFF repeatability study monitoring at λ_{em} = 650 nm.

technique have already been explained in the Experimental Section. The fabricated **polyZn** QSSD emitted a brilliant reddish-orange fluorescence (λ_{max} = 650 nm) in a normal state under UV light (ON state). Small shifting of emission maxima (λ_{em}) from 642 to 650 nm from film to device state is due to exchange of counteranion OAc^- to ClO_4^- in the polymer backbone upon TBAP/MeCN gel treatment. Upon applying a positive potential of 1.6 V, the fluorescence significantly quenched by ~93% and attained an OFF state. However, the emission was regenerated when the voltage was reversed to 0 V. The strong emission has been generated probably because of intraligand charge transfer (ILCT) between the ligand coordination site and the TPA site of the polymer.[58,60] The PL quenching behavior of **polyZn** can be explained in the following way. With the application of +1.6 V vs Ag/Ag^+ leads to the formation of a radical cation or dication of TPA (polaron/bipolaron) upon oxidation of the polymer, which hinders the ILCT and thus PL quench.[1] Simultaneously, by the application of reverse voltage (0.0 V vs Ag/Ag^+), the oxidized $TPA^{\bullet+}$ reverses back to TPA (normal state) showing emission with restoring the ILCT. The emission spectral change of the QSSD with respect to different applied voltages is shown in Figure 5b, and the corresponding ON/OFF photograph is depicted in Figure 5c. The ON/OFF emission behavior was sustained for several cycles, implying good stability (Figure 5d).

Comparative analysis of many reported EC/EFC systems was then conducted to assess the viability and originality of our work. According to the data listed in Table S1, a variety of materials, particularly organic small molecules, exhibited EC/EFC and combined electro-optical emission properties. The majority of these materials exhibited blue/yellow UV emission. However, our fabricated system, **polyZn**, exhibited a strong orange-red emission at 650 nm, which is a fantastic discovery for both bioimaging and military security. Besides, NIR electrochromism adds to the novelty of **polyZn** in dual-mode EC/EFC-switching display devices. We believe our simple strategy for fabricating this type of polymer with EC/EFC properties will encourage young scientists to create distinctive new unique materials in this field.

4. CONCLUSIONS

In conclusion, we have successfully designed and synthesized a luminescent **polyZn** by the 1:1 complexation of Zn(II) ions and the redox-active ditopic ligand $\boldsymbol{L}_{\mathbf{TPA\text{-}TPY}}$. Several spectroscopic and microscopic methods successfully confirmed the chemical structure of the fabricated polymer. The UV−vis complexometric titration study confirmed the hexacoordination of Zn(II) ions by $\boldsymbol{L}_{\mathbf{TPA\text{-}TPY}}$ in the zigzag polymeric chain structure. The high solubility of **polyZn** in methanol facilitated its excellent processability in the conducting substrate. The smooth and uniform polymeric film of ~100 nm prepared through the spin-coating process on the ITO glass substrate exhibits yellow (absorption ~325 nm) to the naked eye and bright orange luminescence under UV light (emission ~642 nm). The redox silent Zn(II)-ion center and redox-active TPA moiety were confirmed by the CV study, revealing $E^\circ_{1/2}$ = 0.6 V (vs Ag/Ag^+) for the TPA to polaronic TPA ($TPA \leftrightarrow TPA^{\bullet+}$) transition. The electrofluorochromic **polyZn** QSSD exhibited intense orange-red luminescence (emission ~650 nm) in the normal state. Upon applying a positive potential (~1.6 V vs NiHCF), the fluorescence was drastically quenched and reappeared at 0.0 V vs NiHCF. Such ON/OFF EFC luminescence associated with significant EC transitions in the metallo-supramolecular polymer structure is being reported for the first time. The novel luminescent Zn(II)-based MSP design should inspire young researchers to develop optoelectronic device applications with dual-mode EC/EFC switching.

■ ASSOCIATED CONTENT

Supporting Information

The Supporting Information is available free of charge at https://pubs.acs.org/doi/10.1021/acsami.3c06673.

Experimental information, ^{1}H NMR of $\boldsymbol{L}_{\mathbf{TPA\text{-}TPY}}$ and polymer, ESI−MS of $\boldsymbol{L}_{\mathbf{TPA\text{-}TPY}}$, scan rate-dependent CV, and device-state EC of the polymer film (PDF)

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Notes

The authors declare no competing financial interest.

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SHORT COMMUNICATION

Diversity of bees in two crops in an agroforestry ecosystem in Kangsabati South Forest Division, Purulia, West Bengal, India

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Abstract: The investigation study assesses the diversity of bees in Brinjal *Solanum melongena* L. and Ridge Gourd *Luffa acutangula* L. crop field from agroforestry ecosystem in South Kangsabati Forest Division, India. The study was carried out in May 2021 to May 2022 that based on transect, focal observation and pan trap samplings. A total of 1,085 individuals were identified during the field work, belonging to three family seven genera (*Apis*, *Tetragonula*, *Xylocopa*, *Ceratina*, *Amegelia*, *Nomia*, and *Megachile*) and seventeen species, the non *Apis* bees (63.78%) were most abundant than *Apis* bees (36.22%). In brinjal, Shannon diversity index of bees is 2.12 and Shannon evenness index is 0.35, whereas, Shannon diversity index in ridge gourd was 1.94 and Shannon evenness index is 0.3. The observations signify greater diversity and population of wild bees. The natural habitat close to agricultural land helps to sustain the diversity and population of wild bees, which enhance the crop quality and yield.

Keywords: Agro forestry, *Apis* bees, eggplant, non *Apis* bees, pollinator, Ridge Gourd, *Tetragonula*, *Xylocopa*.

Now-a-days, agroforestry is an important ecosystem especially in a tropical country and it is an intensive land management system. It consists of agriculture systems and have potential biodiversity conservation sites. The agroforestry ecosystem provide rural livelihood alongside biodiversity conservation in a sustainable land use system. This system is a transitional process from conventional agricultural practices to agro-ecological agricultural practices (Souza et al. 2014). Combination of crops and diverse plants species in forest provide a rich insect diversity due to increased niche diversity than any agro-ecosystems (Stamps & Linit 1998). Heterogeneous agroforestry ecosystem provides floral resources for pollinators (Sinu & Shivanna 2007). Habitat loss and intensification of agricultural practices threaten wild as well as domestic pollinators. Agroforestry ecosystem provides them suitable nesting sites and floral resources, enhancing their pollination services to crops at a landscape level (Sutter 2017; Kay et al. 2019). Bees are the primary pollinators and roughly cover 90% of world plant population (Winfree 2010).

In agriculture land bees are the essential pollinators for pollination as well as crop production. Non *Apis* species are effective pollinators than honey bees (Javorek 2002; Kreman et al. 2002), but they both can together enhance crop production (Greenleaf & Kreman 2006). Brinjal *Solanum melongena* L. and Ridge Gourd *Luffa acutangula* L. are important and widely cultivated crops across the studied area and also bee-attracting vegetable crops. Buzz pollinators are effective pollinators for solanaceous (Brinjal) and cucurbitaceous (ridge gourd) crops. Brinjal flowers have abundance of pollen but to expel the pollen requires vibration by insects called 'buzz pollination'. Wild bees are efficient in buzz pollination than honey bees (Buchmann 1983; Herren & Ochieng 2008). Natural forest is a suitable habitat for wild bees but due to extensive deforestation they are

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in threat. This investigation was carried out to generate information about the diversity of bees in pollination dependent crops in an agroforestry ecosystem.

Study Area

The study was conducted in an agroforestry ecosystem in western part of West Bengal, India. The studied area is in Kangsabati South Forest Division in Purulia. The forest division is situated between 23.166–22.833 N & 86.666–87.000 E, covering 310.27 km^2 areas, which are continuations of the Chotanagpur Plateau (Figure 1). Mixed cropping system is practiced dominantly in the studied area. Fourteen plots were selected randomly throughout the South Kangsabati Forest Division on the basis of easy accessibility and densely blooming flowering plots. These fourteen plots were equally divided into seven plots for each crop. The experimental study was conducted in various farm lands from May 2021 to May 2022 in the eggplant and ridge gourd crops fields.

Methods

All bee surveys were conducting from 0830 h to 1630 h, split in three time hours: 0830–0930 h, 1130–1230 h, & 1530–1630 h. Bees are active in warm, sunny days so rainy and cloudy days were avoided for the unbiased data. Three methods—transect, focal observation (15 mins), and pan traps (yellow, white, blue colored pan traps)—were followed throughout one year of survey. The transect length was 100 m with 2-m breadth on each side (Sutherland 1996). In focal observation (Gibson et al. 2011), a 1 m^2 flowering plot was selected randomly and bees were observed for 15 mins. Pan traps of three different color sets were used for passive sampling (Westphal et al. 2008). Yellow, white, blue pan traps were used which were painted with UV-bright colors. Five clusters of pan traps were installed where each cluster was separated from another by a distance of 15 m. Each cluster contained three sets of pan traps filled with 400 ml soapy water. The species not identified in the field were collected through sweep net, killed by ethyl acetate, and preserved in 70% ethanol for future

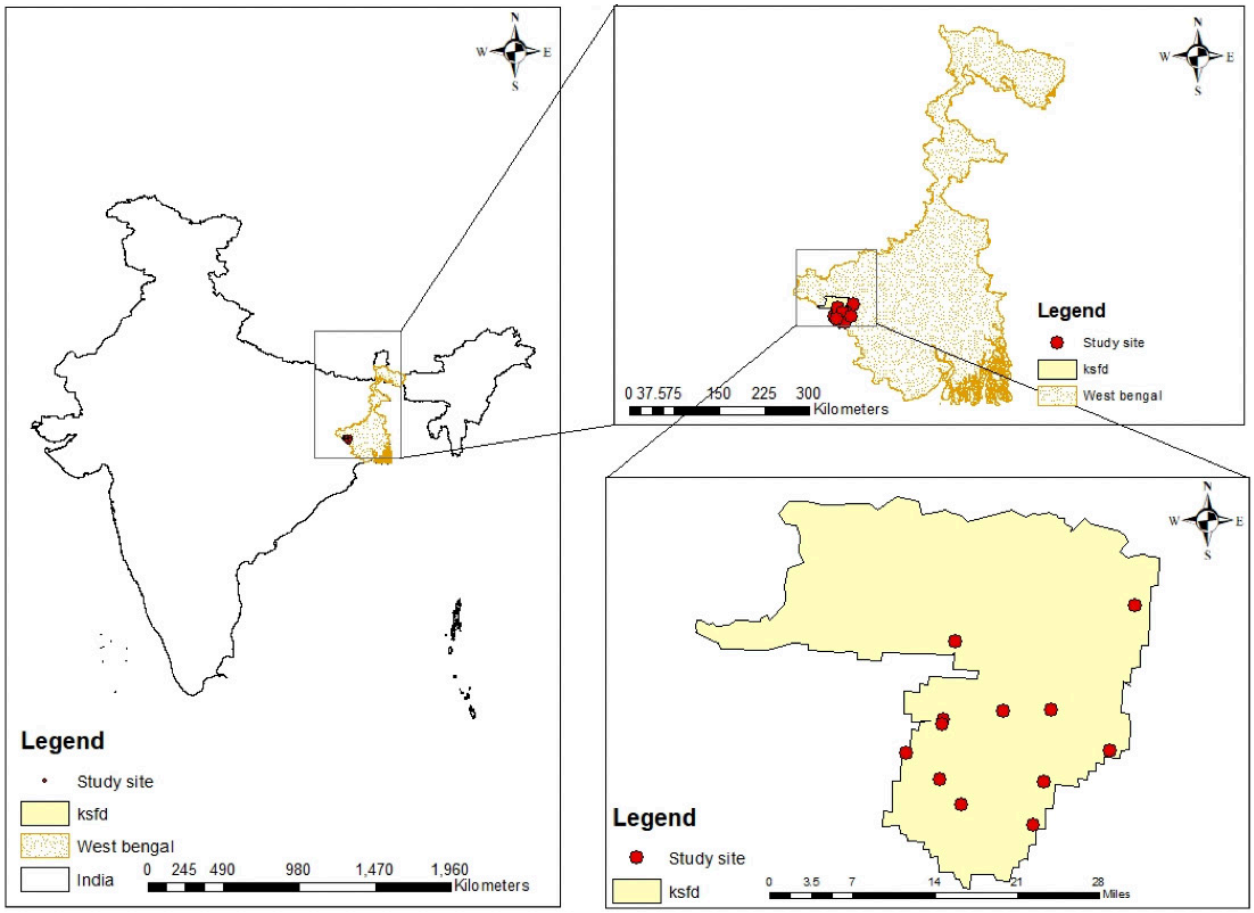

Figure 1. The study site Kangsabati South Forest Division (KSFD), Purulia, West Bengal, India.

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शोध-प्रभा

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श्रीलालबहादुरशास्त्रीराष्ट्रियसंस्कृतविश्वविद्यालयः
केन्द्रीयविश्वविद्यालयः
नवदेहली-16

"व्याकरणस्मृतेरुपयोगिता प्रतिपादने एक समीक्षात्मकम् आलोचनम्"

पार्थ: च्याटार्जी, अतिथि: अध्यापक:(SACT)-धनियाखाली शरत् सेन्टिनारी महाविद्यालय:, हुगली
"(partha.mail90@gmail.com)"

भाषा भावस्य वाहिका- इत्युच्यते। भाषा हि लोकस्य सर्वश्रेष्ठनिधिरस्ति। इयं तु अस्माकं सांस्कृतिक-सामाजिक-व्यवहारस्य माध्यमरुपा।

भाषा तदा कालजयी भविष्यति यदा भाषायाः एकं सुसमृद्धं व्याकरणं भविष्यति। यष्टिं विना पङ्गुप्रख्यः यादृशी अवस्था, व्याकरणं विना भाषायाः तादृशी अवस्था भवति। व्याकरणं तु अपराविद्या। वेदात् एव अस्य उत्पत्तिरभवत्। इदं तु वेदाङ्गम्। छान्दोग्योपनिषदि व्याकरणं "वेदानां वेदम्"इत्यभिधीयते।तत्र भाष्यकारेण शङ्कराचार्येण उक्तं च-"वेदानां वेदं व्याकरणम्।"इत्यर्थः।

भाषायाः स्वरुपं सर्वदा परिवर्तते। भाषायाः आधारेण व्याकरणोन्मेषः भवति। अतः भाषायाः प्रयोगाधारेण परिवर्तनाधारेण च अधुना मया व्याकरणशास्त्रपाठस्य प्रयोजनं वर्णितम् ।

शास्त्रपाठपूर्वं शास्त्रपाठस्य प्रयोजनं प्रतिपादनम् अवश्यमेव कर्तव्यम्।कुतः 'प्रयोजनमविज्ञाय न मन्दोऽपि प्रवर्तते।' प्रसङ्गेण 'श्लोकवार्तिके' कुमारिलभट्टेण चोक्तम्-

" "सर्व्वस्यैव हि" "शास्त्रस्य कर्म्मणो वापि" "कस्यचित्।"
"यावत्" "प्रयोजनं नोक्तं तावत् तत् केन" "गृह्यते।।"१"

व्याकरणस्य मुख्यप्रयोजनविषये महाभाष्यकारेण पतञ्जलिनोक्तम् -" "रक्षोहागमलघ्वसन्देहः" "प्रयोजनम्।"२" अत्र पतञ्जलिना व्याकरणपाठस्य मुख्यरुपेण पञ्च प्रयोजनानि उक्तानि।

असाधुशब्देभ्यः साधुशब्दानां ज्ञानमेव व्याकरणशास्त्राध्ययनस्य साक्षात्प्रयोजनभूतम्। महाभाष्यकारः पतञ्जलिः वदति- " "अथ शब्दानुशासनम्।"" ३ पुनः वेदरक्षोहादीनि व्याकरणाध्ययनस्य परम्परासम्बन्धेन मुख्यप्रयोजनानि भवन्ति। महाभाष्यप्रदीपे चोक्तम्-"भाष्यकारो विवरणकारत्वाद् व्याकरणस्य साक्षात्प्रयोजनमाह अथ शब्दानुशासनमिति। प्रयोजनप्रयोजनानि तु रक्षोहादीनि पश्चाद् वक्ष्यति।"४

(१)"तेऽसुराः"(२)"दुष्टः शब्दः"(३)"यदधीतम्"(४)"यस्तु प्रयुङ्क्ते"(५)"अविद्वांसः"(६) "विभक्तिं कुर्वन्ति"(७)"यो वा इमान्"(८)"चत्वारि"(९)"उत त्वः"(१०)"सक्तुमिव"(११)
"सारस्वतीम्"(१२)"दशम्यां पुत्रस्य"(१३)"सुदेवो असि वरुणः"इति ।।(१२)-इमानि शास्त्रवाक्यानि वेदस्य ब्राह्मणग्रन्थेभ्यः उद्धृतानि। एतेभ्यः शास्त्रवाक्येभ्यः व्याकरणाध्ययनस्य आनुषङ्गिकप्रयोजनानि सूचितानि।आगमादयः यथा व्याकरणाध्ययनस्य प्रवर्तकाः तथा 'तेऽसुराः'प्रभृतयः व्याकरणाध्ययनस्य प्रवर्तकाः भवन्ति।म्लेच्छता निवारणमपि व्याकरणाध्ययनस्य प्रयोजनम्। महाभाष्यकारेणोक्तम् - " "तस्माद्" "ब्राह्मणेन न म्लेच्छितवै" "नापभाषितवै," "म्लेच्छो ह वा यदपशब्दः।"" "म्लेच्छा मा भूमेत्यध्येयं" "व्याकरणम्। "तेऽसुराः"५" ।।१३।। महाभाष्यकारः पतञ्जलिः शास्त्रवाक्यानाम् प्रत्येकं प्रथमम् अंशम् उद्धृतवान् पर्यायक्रमेण च तेषां सम्पूर्णोल्लेखपूर्वकं व्याख्यातवान्। अत्र मया व्याकरणाध्ययनस्य परम्परासम्बन्धेन मुख्यप्रयोजनानि लिख्यते।

व्याकरणं वेदपुरुषस्य मुखरुपेण कल्पितमस्ति। पाणिनीयशिक्षायाम् उक्तं च- " "वेदस्य मुखं व्याकरणं स्मृतम्।"" ६ व्याकरणं षट्सु वेदाङ्गेषु प्रधानं च सर्वेषां तपसाम् उत्तमं तपः।"वाक्यपदीये" भर्तृहरिणोक्तम्-

" "आसन्नं" "ब्रह्मणस्तस्य" "तपसामुत्तमं तपः।"
"प्रथमं" "छन्दसामङ्गं प्राहुर्व्याकरणं" "बुधाः।।"७"

Asymmetrical Arrangement of Federalism with Special Reference to India

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Abstract

The objective of this paper is to examine the asymmetrical arrangement of federation especially in India. Asymmetry is inherently linked with all federations. The meaning of asymmetry federalism is, federalism based on unequal power and relationship in the political, administrative and fiscal arrangements sphere between the units constituting the federation and it can be viewed in both vertical (between centre and states) and horizontal (among the states) senses in a federation. However, there was an agitation in the existence of asymmetry which makes the federation stable or unstable. To run the federation successfully, few people think there should be limitations in asymmetry.

The central government in India have the power, and it actually does invade the legislative and executive domains of the state. India being such a diverse country accommodates various sub-national and ethno-cultural identities in some cases, constitutional recognition has been given to the asymmetrical arrangement. So far Indian federalism is running successfully.

Keywords: Asymmetric Federalism, Federation, Federalism, Confederation, Subcontinent, Social-Economic Diversity.

Introduction

This paper provides an overview and analysis of asymmetry in Indian federalism. India is an ancient country. India's civilization and culture are full of variations. In India we can see the amalgamation of various races, languages, religions, and cultures. In fact, India is a large and variegated cultural subcontinent. India's people are divided into many small communities on the basis of the geographical formation, local history, language, religion, nationality and economic development. In this context, various rival multiparty systems are also established in India.in this multicultural circumstance, Indian federal system in capable of establishing the national integration. This federal system is established as a weapon to administrate the conflict between the various races and communities. In recent times in Asia's three countries-India, Pakistan and Malaysia the federal system has established formally, in the only India's federal system become relatively successful. In the year 1965 Singapore has been deviated from Malaysia. In 1971 Bangladesh is also separated from Pakistan. Though we can see that there are so many crises arises in the political system of India, but with the help of the democracy and federal system India can protect its multiculturalism and provincial autonomy in one hand and on the other hand its national integration is established. In fact, India is not a nation state, but a multicultural federation.

The paper is structured as follows:

In Section I, I briefly described the meaning, features and evolution of federalism. I focused on the definition of federalism given by many thinkers. In Section II, I examined meaning of asymmetry and asymmetrical arrangement in global context. Basically we see two types of asymmetry, political and constitutional. In Section III, I discussed about the asymmetry seen in India and its historical background.

Section I

The federal system is such a system of governance in which the government at the regional level and the government at the national level share power among themselves. Federalism denotes a mixed form of government. It denotes the synthesis of the regional and the general government within a political system. The government at the national level is called the central government or the federal government and the regional government is called in various places by various names such as state, province, canton, territorial government and so on. The constitutional or government structure that grows within a Federation is called Federalism. Federation is a process through which certain separate States get transformed into one Federal State. And Federalism is a special type of government that develops within a Federal State. Federation, confederation and unitary state they are not the same.

According to Watts (1996) "Federalism is basically not a descriptive but a normative term and refers to the advocacy of multi-tiered government combining elements of shared rule and regional self-rule".

According to Riker (1975) "Federalism is a political organization in which the activities of government are divided between regional governments and a central government in such a way that each kind of government has some activities on which it makes final decisions."

According to Elazar (1991) "Federalism is a partnership between individuals and families leading to the formation of a body politic and between bodies politic leading to the creation of compound polity".

The Federal system, as a concept, is ancient. The notion of Federal system has grown and developed since ancient times. The concept of federal system was first found around 3200 years ago among the ancient Israeli tribes. Apart from that, such a system had also developed in various North American, Greek, African and Asian tribes. Even the Roman Republic had formed a sort of unequally distributed federal structure. Various medieval self-governed cities were connected to each other through Loose Confederation, for the purpose of trade, commerce and defence. Because of this fact, the Swiss Confederation was formed in the year 1291. Though, the newly independent nations had established the federal system after the American revolution of the year 1781, these systems had certain shortcomings and deficiencies in them. These deficiencies were rectified through the Philadelphia Convention of 1787 and in 1789 the first modern federal system came into existence. In fact in the year 1848, after the civil war, the Confederation in Switzerland also assumed the form of a Federation.

Apart from these, Australia and Canada also formed the federal system. During the nineteenth and the twentieth century several countries in Latin America adopted the federal system. From twentieth-century onwards, especially after the Second World War, the notion of federal system began developing. The newer Asian and African nations started depending on federal principle in order to free the nations from the various ethnic troubles, thereby peacefully unifying the nations. Even the west Asian and the eastern Mediterranean regions also had to face the same problems. The federal system grew and developed in various Asian countries such as Indonesia, India, Pakistan and Malaysia; African countries like Libya, Ethiopia, Nigeria, Congo, Mali and Cameron; West Indies and several other places. However, this system could not be successfully implemented in all of these places. Apart from Asia and Africa, the federal system has been adopted by Central and European regions such as Austria, Germany, and Yugoslavia, Czechoslovakia and certain other South American regions such as Brazil, Venezuela, Argentina and many others as well. To sum it up, with the creation of nation states after the Second World War, the establishment of federal system also gained wide popularity as a path breaking idea.

The common structural characteristics of Federalism are the following:

1. Two orders of government each acting directly on their citizens.
2. A formal constitutional distribution of legislative and executive authority and allocation of revenue resources between two orders of government ensuring areas of genuine autonomy for each order.
3. Provision for the designated representation of distinct regional views within the federal policy-making institutions, usually provided by the particular form of the federal second chamber.
4. A supreme written constitution not unilaterally amendable and requiring the consent of a significant proportion of the constitutional units.
5. An umpire (in the form of courts or provision for referendums) to rule on disputes between governments.
6. Processes and institutions to facilitate intergovernmental collaboration for those areas where governmental responsibilities are shared or inevitably overlap.

Section II

Federalism is not a new concept, but it is a complex one. It was not born out of theory, but rather out of necessity. It was a pragmatic approach utilized by States for primarily military and economic reasons. But the purpose of forming Federalism is not just the establishment of uniformity. Federalism also aims at protecting various kinds of diversity and accommodating diversities those within a single space. This notion of Federalism entails Asymmetry. The concept of Asymmetry remains concealed within every Federation. There is no reason to think that any Federation would be characterized by complete equality and symmetry. A symmetrical Federation is the ideal type of Federation. Complete equality is neither possible nor desirable in any Federation. Inequality can be observed in every Federation or

confederation, in one field or the other. However, that does not necessarily mean that every Federation would be filled with inequality. Every Federations must strive towards minimizing inequality. The presence of a high degree of inequality in a Federation causes difficulty in sustaining it.

According to Charles D. Tarlton, recognizing and acknowledging diversity alone will not resolve all the tension within an Asymmetrical System. He placed more emphasis on Centralization. According to him it is possible to achieve synthesis among the various units of a political system through the establishment of Symmetry. From his point of view, Asymmetry proves to be inconsistent in achieving stability within a polity. Asymmetry is a bone of contention among various Federations in the present time. On one hand, many scholars have argued that asymmetrical federalism only serves to entrench differences, solidify divisions and encouraging secession. On the other hand, some scholars have argued that Asymmetry is a positive method of increasing stability in any Federation (by recognizing and accommodating various diversity). Therefore, whether Asymmetry hinders stability or ushers in instability in any Federation is still an issue that is fraught with questions.

Normally, we find two types of Asymmetries in a federal system- Political Asymmetry and Constitutional Asymmetry. According to Ronald Watts, 'Political Asymmetry arises from the impact of cultural, economic, social and political conditions affecting relative power, influence and relations of different regional units with each other and with the federal government". This political asymmetry can be observed in every federation. But Constitutional Asymmetry may not be present in every Federation. Constitutional Asymmetry mainly arises out of the restoration of power to the various regional units, through the Constitution. Political asymmetry lies hidden within the regional units of every Federation. In this case, certain factors like people, territorial size and economic resources can influence centre-state and inter-state relations to a large extent. Asymmetry acquires gigantic proportions in those Federations where one or two regional units hold maximum power. The magnitude of Asymmetry remains high in those Federations where the population of any one regional unit exceeds half of the total population of the Federation. Prussia within German Federation, Jamaica within West Indies Federation. East Pakistan within Pakistan, Russia within former USSR, and the Czech Republic within Czechoslovakia prior to separation of 1992 and the Flemish region within the current Belgian Federation are a few examples of this kind of Asymmetry. On the other hand, examples of places where two constituent units are more dominant are Ontario and Quebec in Canada's combined population of 62 percent) and New South Wales and Victoria in Australia (combined population 60 percent). Apart from these, in places like Belgium, Germany and South Africa, political asymmetry among regional units that remain has been the product of constitutional revision. Apart from population, territorial size and wealth also significantly increase asymmetry among the regional units. This political asymmetry among the units influences their ability to exercise constitutional powers. Political Asymmetry within Federations has created a site of instability and tension within each

Federation.

Though not found in all Federations, Constitutional asymmetry is found in quite a large number of federations. Constitutional Asymmetry lies chiefly within the Constitution. The inequality that is observed in the distribution of administrative and legal powers among the regional units (by means of the Constitution) is itself a glaring display of Constitutional Asymmetry. In several federations, the distribution of executive, jurisdictional and financial powers is equal. Whereas, in many cases, unequal power distribution takes place due to the variation in geographical size, population and certain other factors. Besides, in Malaysia, the Centre possesses Taxing power instead of distributing it among the states. This is why, tax sharing is delayed in case of those states where opposition parties exist. As the states do not possess any taxing power, they are bound to remain dependent on the Centre. Besides, an Asymmetric Relationship is observed in the case of power distribution. While the 11 States of the Malay Peninsula enjoy equal power, the two Borneo States enjoy 'Greater Autonomy' for the purpose of protecting their 'Non-Malayan' interest. As a result, the rest of the states feel deprived and discontented (Watts 1996:26). Centre, due to its discriminatory treatment towards these states, casts an adverse impact on the Inter-governmental Relation. Broadly speaking, three types of Constitutional asymmetry are observed.

1) In certain Federations, federal authority is increased in certain specific fields while regional autonomy is decreased. For example, in India and Nyasa land (1953-1963).

2) In certain cases, the power of certain regional units is increased. One such example is when the Borneo states joined with the Malaysian Federation in 1963.

3) Such arrangements retain the formal symmetrical application of the constitutional distribution of powers to all member states, but provide specific means for accommodating within that framework a de facto asymmetry among member States in the exercise of these powers.

Constitutional Asymmetry is not just observed in India, but in various other nations as well. The European Union, Russia and Belgium have exhibited some degree of constitutional asymmetry in the application of jurisdiction. The European Union, at various times, has had to make particular concessions in order to grant access to new members. Furthermore, the European Union found it necessary to accept some degree of asymmetry, particularly with reference to Britain and Denmark, in order to successfully adopt and implement the Maastricht Treaty. The Russian Federation is currently the most complex example of constitutional asymmetry in a federal political system. The Russian Federation has to perform negotiations among the 89 component units that consist of republics, oblasts, okrugs etc. Many of the constituent units of the Russian Federation have concluded bilateral treaties providing for an asymmetrical treatment, all the while remaining within a formally symmetrical framework. In the Belgian federation, asymmetry exists in the interrelation between Regional Councils and Community Councils and the jurisdictional differences of the three territorials constituent regions

and the three non- territorial constituent communities.

The constitutional allocation of financial resources significantly influences the power and autonomy of that the member states exercise. Constitutional asymmetry among regional units of a Federation introduce complexity. Nevertheless, in some Federations, asymmetry in the constitutional distribution of power has proved to be indispensable in accommodating the varying pressures for regional autonomy. Malaysia, Canada, India and Belgium are most notable examples of this. In other cases, asymmetry has proved to be useful in transitioning from one political stage to another. Examples of these are the asymmetry in Spain to accommodate autonomous communities and in Europe to accommodate "variable geometry" proceeding at "Varying speeds". In some cases, asymmetry has produced a counter-demand for symmetry. In Canada and Spain, it has been observed that asymmetry beyond a certain limit is bound to create dysfunctions. Nevertheless, certain Federations have made way for constitutional asymmetry in order to accommodate differences between constitutional units and are still running efficiently

Section III

India is an example of asymmetrical federalism. The process of formation of federalism is the main reason for asymmetric arrangement. In India federalism was formed by division. Earlier India was a single state which was then divided into different states based on factors like language, culture, race, ethnicity etc in order to 1956 State Reorganization Act for the same reason there is so much asymmetry among constituent units. At first, we have to know the historical background of Indian federalism.

India is a subcontinent. Its population is huge. In various regions, there are wide range of differences between the socio-economic, political tradition and life style. In such a multicultural country, the unitary ruling system must be fail. Therefore we can see that any emperor or king cannot constitute their rule or control over India for long times for an example, we can say about the Mourya empires, Mughal empires etc. In fact it is quite impossible for any individual central government to establish their rule in such like country. During colonial period the concept of regional autonomy is quite insignificant. Makbul Ali Laskar has pointed out the historical and institutional events that worked behind the formation of Federation in India. He has even discussed the territorial and non-territorial facets of Indian Federalism. He has also discussed how the British came to India with the intention of carrying out business, how they gradually established a stronghold in India's politics, administration and economy, the various laws that had been passed by the British in the Parliament in order to rule India, the contribution of the Government of India Act of 1935 towards the formation of Federalism in India etc.

However, an asymmetrical pattern of power-sharing at the national, local and provincial levels can also be observed in pre-Independence Mughal and British India. Various asymmetrical proposals had sprung up before the Indian independence. The Cabinet Mission of 1946 said that India shall be

constructed in the form of a confederation. The nation shall have a weak government, under which there will be two powerful confederation units, one Hindu-majority province, one Muslim-majority province and a Princely state. On the other hand, on 13th December of the year 1946, Jawaharlal Nehru in his Objective resolution presented the proposal of a parliamentary Federal system with a strong centre. Another proposal had sprung up. The proposal had been presented by the Congress leader of Madras Chakravarty Rajagopalachari (CR) who said that India shall be a Confederation of two groups of states in terms of their territorial location in the north and the south. However, the confederal schemes with asymmetrical features have not been accepted. After the CR and Cabinet proposals were rejected, the Constituent Assembly decided to set an Objective Resolution, in other words, a parliamentary federal Constitution with a strong centre. Therefore, we can see that an asymmetric arrangement of Indian Federalism was already in existence which gained acceptance through the Constitution, in the post-independent period.The constituent units of the Indian Federation are very unequal in terms of size, population and resources. These unequal characteristics of the constituent units are reflected in asymmetrical federal relations. In India, various states have been formed on the basis of various factors such as language, race and culture. Due to this reason, the states vary greatly from each other which in turn causes each state to have a different kind of relation with the Centre. These differences arise out of the distribution of executive, financial and jurisdictional power among states. Certain kinds of asymmetry have been accepted in the Indian federal structure, which are to be discussed in the following section.The constitution of India provided certain rights and privileges to the rulers of Indian States (princely state) under Article 362, which was later repealed by the Constitution 26th Amendment Act, 1971. Under Article 370, special privileges have been granted to Jammu and Kashmir. According to Article 370, Jammu and Kashmir have been excluded from the uniform constitutional structure of India. Jammu and Kashmir has been granted permission to frame their own constitution. Because of the special provisions given to the8 tribal people of Jammu and Kashmir, they have acquired a unique position in the Indian Union. In order to accommodate ethno-cultural diversity within the Federal system, certain constituent units of India have been granted special provisions (under Articles 371, 371-A, 371-B), which has given constitutional recognition to the asymmetrical arrangement. According to Article 317(A), Nagaland has been granted special powers. The Parliament cannot legislate in particular fields such as (a) religious and social practices of the Nagas. (b) Naga customary law. (c) Ownership and transfer of land and its resources. The parliament cannot make laws in the aforementioned fields, unless and until it is granted permission by the Legislative Assembly of Nagaland. Under Article 371(G), Mizoram has been granted some special provisions. According to Article 371(B) and Article 371(C), the President may, by order made with respect to the State of Manipur, provide for the constitution and functions of a committee of the Legislative Assembly of the state consisting of members of that assembly elected from the hill areas of the State. According to

Article 371(D), Andhra Pradesh too has been given special status. The article also talks about granting equal opportunity to every resident dwelling in different parts of the State, as far as public employment and education is concerned. Article 371(F) has granted special provisions to Sikkim. It talks about preserving the interests and rights of every resident dwelling in every section of the state, by reserving seats for them in the Legislative Assembly. Under Article 371(H) the governor of Arunachal Pradesh shall have special responsibility with respect to law and order in the state of Arunachal Pradesh. Under Article 371(I), Goa has been granted a special provision. The provision is that the Legislative Assembly of Goa shall consist of not less than thirty members.

The Fifth and Sixth Schedules have made more Asymmetrical arrangements in order to accommodate other sub-national diversity within the Federal System of India. Sixth The schedule is different from the Fifth Schedule. Under Articles 244(2) and 275(1), the tribal people of Assam, Meghalaya, Tripura and Mizoram have been granted special provisions. In accordance with the Sixth Schedule, an autonomous district and regional council with law-making power, has been formed for the tribal people. These autonomous councils are directly governed by the Governor. This Sixth Schedule allows for the creation of area-specific development boards, particularly in those places that come under HDI. Under Article 244(1), the Fifth Schedule deals with the control and administration of the scheduled areas. The Fifth Schedule talks about the formation of a Tribes Advisory Council for the tribal people. Apart from special provisions for tribal people, provisions have also been granted to the union territories of Delhi and Puducherry. These are the provision of Legislative assemblies in these two union territories and the provision for setting up High Courts in Union Territories (Article 239-A, 239-AA, 240,241 etc).

Apart from these, the significant difference of the representation of states in the Union Parliament in fact reinforces the need for special asymmetrical federal provisions for the smaller constituent states of the Indian Federation. Under clause 4 of Article 80, the members of the Council of States must be elected by the elected members of the Legislative Assembly of the States through a single transferable vote system on the basis of proportional representation. As a result of this, ten populous states occupy 160 seats which constitutes more than seventy percent of the total number of seats. Due to this, the smaller states are deprived of equal representation in the Council of States. Sikkim and other northeastern tribal states get one seat each in the Rajya Sabha. This asymmetrical nature of representation augments the inequality in the federal structure. But in the U.S.A., all states, small or big are accorded equal representation in the federal second chamber. The Senate is also given equal power with the House of representative in most matters and certain special powers e.g. ratification of executive and diplomatic appointments made by the president and international treaties signed by him or her. At present, because of the FDI, certain units are progressing rapidly with the help of maintaining a healthy relationship with the Centre. However, all states are not able to do the same.

Another kind of political asymmetry is seen in the sphere of fiscal federalism in terms of the distribution of revenues between the union and the states, the distribution of taxes between them, and grants from the union to certain states. Asymmetry is observed even regarding the grants that the states receive from the Centre through the Planning Commission created by the Nehru government in 1950 (NITI Ayog at

present).1990s onwards, Maharashtra, Andhra Pradesh, Rajasthan and Gujarat have registered a rate of economic growth above the national average. On the other hand, Bihar, Uttar Pradesh and Orissa have experienced economic decline. This has led to economic disparities in the post-1990s globalization era.

Conclusion:

So, asymmetrical arrangement has been observed in various fields in India. India is chiefly a multicultural, multilingual and diverse country. These varieties and the various diverse identities of people have been constitutionally accepted. The Asymmetrical arrangement in the Indian Federation has been made chiefly with the view to accommodating various clans in a single space by granting them special provisions. While the presence of Asymmetry highlights the instability in a Federation but the Indian Federation, like many other Federations, is running successfully.

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CASTE, SCOURGE AND OPPRESSION AS TENETS OF MANUAL SCAVENGING

Dr. Veera Renuka Lobo, Assistant Professor, Political Science, Sarat Centenary College
West Bengal

Abstract
The manual scavengers work is dangerous, hazardous, unclean, degrading, and above all, even today, the very presence of manual cleaning of the sewage system, septic tanks, and manholes continues in India. Manual scavenger refers to a person who manually cleans, carries, disposes, or handles human excreta from dry toilets and sewers. In our country this work is done under the guise of caste system, the oppressed classes are somehow made to maintain this systematic scourge. This article tries to look into this aspect and tries to highlight on the act that tries to null away with the practice of scavenging in bare oppressed hands.

Keywords: manual scavenging, caste, oppression, act, India

Manual scavenging, a caste-based-forced occupation,[1] has been in practice in several parts of India. It is the manual cleaning of human and animal excreta with the help of brooms and small tin plates and carrying them in baskets for disposal at a designated place, which is far away from the living area. Across India, castes that work as "manual scavengers" collect human excrement on a daily basis, and carry it away in cane baskets for disposal. Women from this caste usually clean dry toilets in homes, while men do the more physically demanding cleaning of sewers and septic tanks. In India we have caste hierarchy, it is ubiquitous and this has resulted in an ideal tolerant of diversity [2].

The international labour organisation (ILO) mentioned [3] the existence of three forms of manual scavenging in all over India, i.e., removal of human excreta from public streets and dry latrine, cleaning septic tanks and cleaning gutters and sewers. The human waste management in India can be classified into four categories [4]: (1) Manual scavenging: A caste-based practice where a sanitation worker scoops waste from dry latrines and dumps it in a gutter or dumping site at some distance from the households; (2) Manual pit emptying: The pits / tanks that latrines are connected to may need to be emptied manually for various reasons; (3) Manual sewer servicing: Only 12-15% of the Indian population is connected to sewers, but sewers become blocked and may need to be manually unblocked; and (4) Mechanical servicing: Mechanization (such as a pump with a hose) is used to unblock sewers and empty pits.

The allocation of labor on the basis of caste is one of the fundamental tenets of the Hindu Situational Analysis [5] and Recommendations on Manual Scavenging. Within this system dalits have been assigned tasks and occupations which are deemed ritually polluting by other caste communities - such as sweeping, disposal of dead animals and leatherwork. By reason of their birth, dalits are considered to be "polluted", and the removal of human and animal waste by members of the "sweeper" community is allocated to them and strictly enforced. Caste is an overbearing [6] identity. It is not simply a tag of identity but dictates a way of life. It continues to reinforce inequality of basic value and the allocation of labour is one of its prime manifestations.

The caste system assists in believing that all work related to dirt is a lot of the low castes. Because of this not only the upper castes but castes within the smaller castes do not associate with dirt lifting castes. And this has transcended the confines of Hinduism alone to become a way of living that pervades all of Indian society. Gandhi would hail manual scavengers [7] as he used to "I am not ashamed of myself called manual scavenging, and I invoke manual scavengers not to be ashamed of being called one. This society is based on many services, a scavenger is at the base of the service. That being one of the many reasons why Ambedkar was in war of ideas with Gandhiji.

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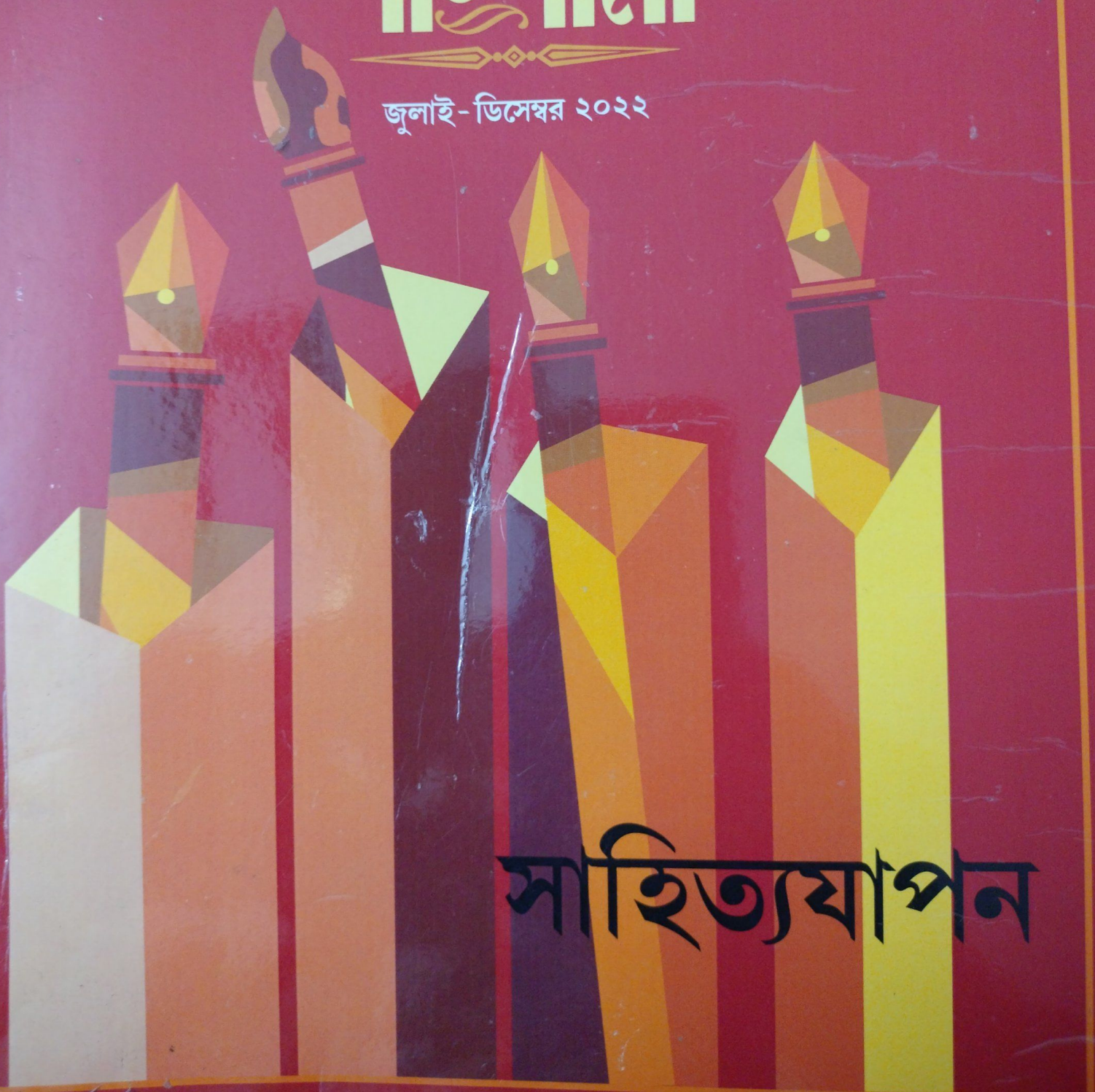

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সূ চি প ত্র

Impact of Cluster Development Programme on MSME Sector in West Bengal: An Empirical Study

Rintu Nath

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Keywords: Cluster, CDP, MSMEs, Capacity Building, Academics

Abstract

The MSME sector, which is also considered the backbone of the countryâ€™s manufacturing output, is facing stiff competition from large-scale as well as multinational manufacturers. The Cluster Development Programme (CDP) was introduced by the Ministry of MSME, Government of India in 2007. The CDP acts as a protection mechanism for the second largest employment generating MSME sector. CDP is used to improve the productivity, competitiveness and capacity building of MSMEs. The aim of this study is to examine and assess the impact of Cluster Development Programme on MSME sector, using eight selected clusters in West Bengal as case study. The results of the study show that MSMEs have benefited greatly from CDP. The results could be useful to the MSME department and its policymakers, new entrepreneurs, researchers, as well as government and academic institutions.

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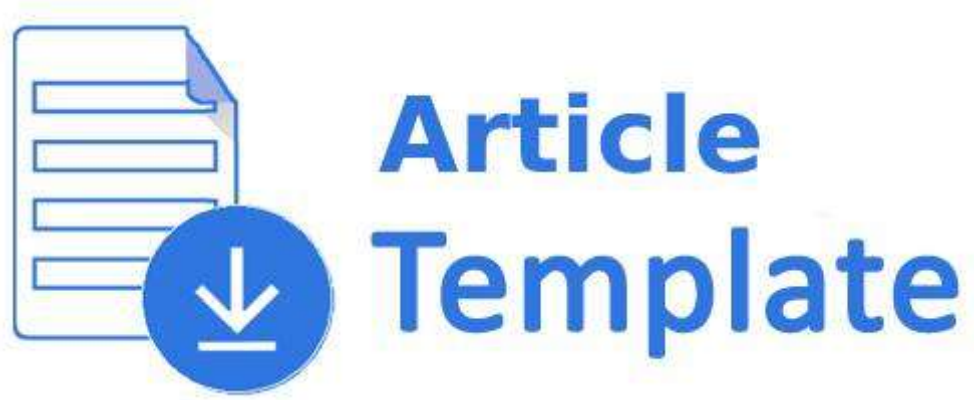

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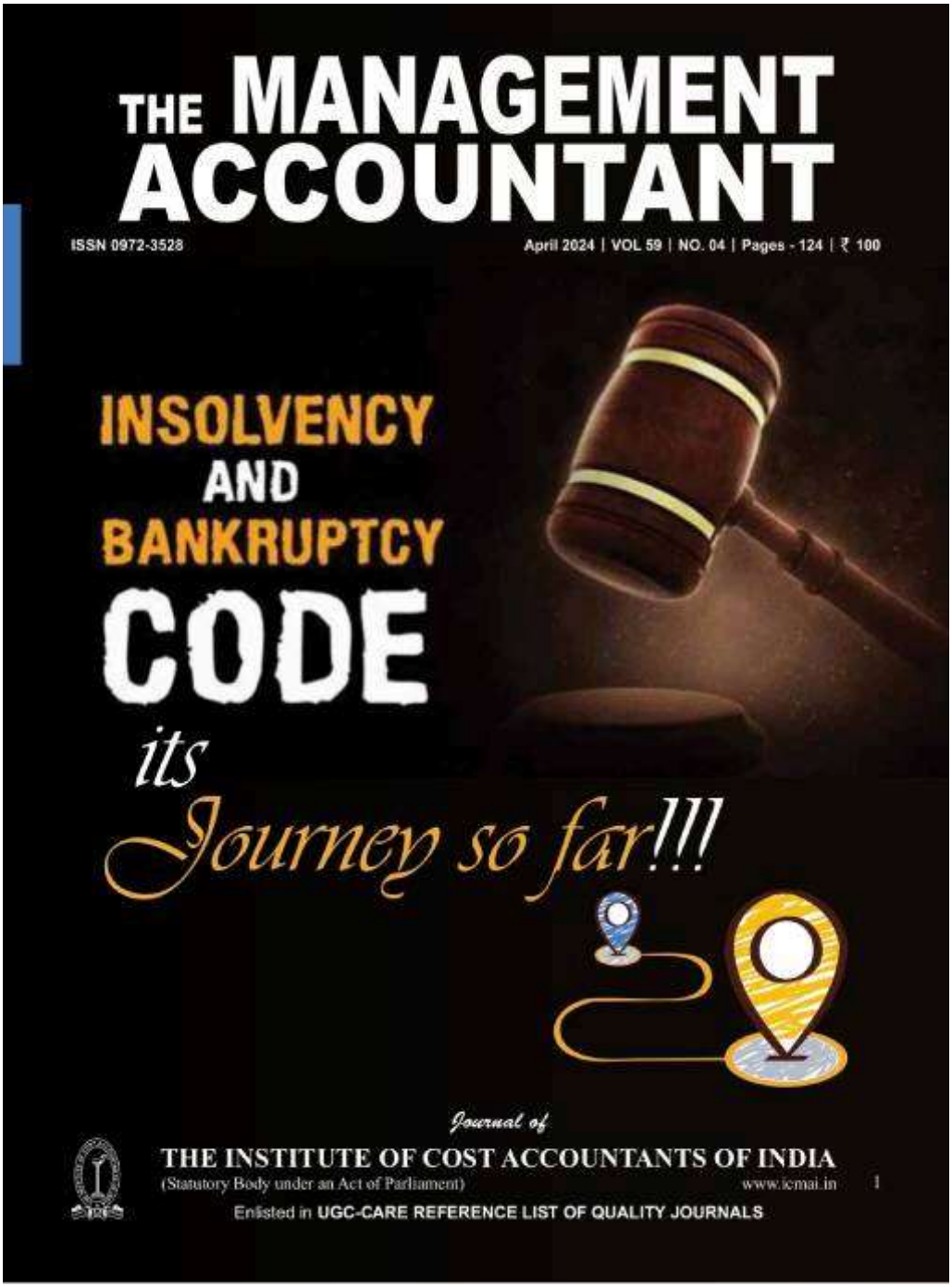

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