BEYOND INFINITY

A newsletter from Department of Mathematics, VNIT, Nagpur, Issue 4, April 2021

From HODs Desk

Mathematics is a one of the oldest and most used subjects. Due to its usefulness and important contribution people have also named mathematics as 'Queen of Science'. It is my pleasure to present this newsletter containing contributions and achievements of faculty members and students of the Department. Department has 13 young dynamic faculty members who are contributing quality of teaching and research in various fields mathematics in addition to their contributions in central administration. Ph. D. scholars of achievements in quality of research publication are notable. The coordinator and members of the editorial team deserves special thanks as even in the present pandemic situation they made all essential efforts to bring out this newsletter. I hope this news letter may be able to provide you some glimpses of the development of Mathematics Department.

Dr. G. P. Singh
Head of the Department

Faculty Members:

Dr. G. P. Singh (Head), Professor

Dr. P. P. Chakravarthy, Professor

Dr. Pallavi Mahale, Associate Professor

Dr. M. Devakar, Associate Professor

Dr. G. Naga Raju, Assistant Professor

Dr. rer. nat. Pradip Roul, Assistant Professor

Dr. Deepesh Kumar Patel, Assistant Professor

Dr. Jyoti Singh, Assistant Professor

Dr. Sathish Kumar A., Assistant Professor

Dr. Sourav Pradhan, Assistant Professor

Dr. V. P. Singh, Assistant Professor

Dr. Vijender Nallapu, Assistant Professor

Dr. Purnima Satapathy, Assistant Professor

Department on Institute Map

The Department of Mathematics grew from its humble beginnings in the year 1960. Although, the department is small in terms of manpower, but has been contributing significantly to the development of the institute in terms of quality teaching, student learning and research. The faculties have produced a large number of research papers in reputed national and international journals and have collaborative research engagement with reputed national and international institutions. Moreover, the faculty members are presently engaged in a number of R&D projects funded by DST, NBHM, BRNS and CSIR. In addition to teaching and research, the Department of Mathematics has a great impact on institute administrative positions. The alumni of the department are placed in good positions at the national and international level. Department has organized several short term training programs, workshops and conferences.

Papers published :

1. G. P. Singh, Ashwini Lalke and N. Hulke, Some Bianchi type I dark energy models in Brans-Dicke theory, Pramana: Journal of Physics, 94, 147, October 2020
2. G. P. Singh, Ashwini Lalke and N. Hulke, Study of particle creation with quadratic equation of state in higher derivative theory, Brazilian Journal of Physics, 50 , 725-743, September 2020.

3. Shivhare, M., Podila, P.C. & Kumar, D. A uniformly convergent quadratic B-spline collocation method for singularly perturbed parabolic partial differential equations with two small parameters. *J Math Chem* 59, 186–215 (2021). https://doi.org/10.1007/s10910-020-01190-7
4. P. Pramod Chakravarthy, Meenakshi Shivhare, Numerical study of a singularly perturbed two parameter problems on a modified Bakhavalov mesh, Computational Mathematics and Mathematical Physics, 2020, Vol. 60, No. 11, pp. 1778–1786. © Pleiades Publishing, Ltd., 2020.
5. Kamalesh Kumar and Pramod Chakravarthy Podila: A new stable finite difference scheme and its error analysis for two‐dimensional singularly perturbed convection–diffusion equations, First published: 29 December 2020, https://doi.org/10.1002/num.22732.
6. Meenakshi Shivhare, P. Pramod Chakravarthy, Higinio Ramos, and Jesus Vigo-Aguiar: Quadratic B-spline collocation method for time dependent singularly perturbed differential-difference equation arising in the modelling of neuronal activity, accepted in Numerical Methods for Partial Differential Equations, https://doi.org/10.1002/num.22738
7. P. Pramod Chakravarthy, Meenakshi Shivhare and Devendra Kumar: "Quadratic B-spline collocation method for two-parameter singularly perturbed problem on exponentially graded mesh", International Journal of Computer Mathematics. Accepted.
8. Kamalesh Kumar, Pramod Chakravarthy Podila, Pratibhamoy Das and Higinio Ramos: A graded mesh refinement approach for boundary layer originated singularly perturbed time-delayed parabolic convection diffusion problems, accepted in *Math Meth Appl Sci*. (15-02-2021).
9. D. Srinivas Reddy, M. Devakar, B. Shankar, Analytical Solutions of Unidirectional Flows of Couple Stress Fluid between Concentric Cylinders through Porous Medium With Slip Boundary Conditions, Solid State Technology, 64 (2), pp. 1418-1437, 2021.
10. Ankush Raje, M. Devakar, Unsteady Magnetohydrodynamic Flow of Two Immiscible Fluids Through a Pipe in Presence of Heat Transfer, Mathematical Modeling, Computational Intelligence Techniques and Renewable Energy; Advances in Intelligent Systems and Computing, 1287, 287-297, 20
11. G. Naga Raju, Ashlesha A. Bhise: "Modified third and fifth order WENO schemes for Inviscid Compressible Flows," Numerical Algorithms, (2020) DOI: 10.1007/s11075- 020-01039-9.
12. Samala Rathan , Naga Raju Gande , Ashlesha A. Bhise: " Simple smoothness indicator WENO-Z scheme for hyperbolic conservation laws," Applied Numerical Mathematics 157 (2020) 255–275.
13. Naga Raju Gande, Ashlesha A. Bhise: Third-order WENO schemes with kinetic flux vector splitting, Applied Mathematics and Computation, 378 (2020), 125203. doi: 10.1016/j.amc.2020.125203
14. H.K. Nashine, R. Arab, P.R. Patle, and D.K. Patel, Best proximity point results via measure of noncompactness and application, Numerical Functional Analysis and Optimization, Accepted in January 2021. DOI : 10.1080/01630563.2021.1884570.
15. P. Roul, V.M.K. Prasad Goura, Klaus Kassner, A new higher order computational approach for electro-hydrodynamic flow of a fluid in an ion -drag configuration in a circular cylindrical conduit, *Applied Numerical Mathematics*, 165, 2021, 303-321.
16. P. Roul, Vikas Rohil, Gilberto Espinosa-Paredes, VMK P. Goura, R. S. Gedam, K. Obaidurrahman, Design and analysis of a numerical method for fractional neutron diffusion equation with delayed neutrons, *Applied Numerical Mathematics,* 157, 634-653, 2020.
17. P. Roul, Vikas Rohil, Gilberto Espinosa-Paredes, K. Obaidurrahman, An efficient numerical method for fractional neutron diffusion equation in the presence of different types of reactivities, Annals of Nuclear Energy, Elsevier, https://doi.org/10.1016/j.anucene.2020.108038.
18. P. Roul, V.M.K.P. Goura, A high order numerical scheme for solving a class of non-homogeneous time-fractional reaction diffusion equation, *Numerical Methods for Partial Differential Equations,* Wiley, DOI: 10.1002/num.22594, 2020.
19. P. Roul, T. Kumari, VMKP Goura, An efficient numerical method based on exponential B-spline basis functions for solving a class of nonlinear singular boundary value problems with Neumann and Robin boundary conditions, *Mathematical Methods in the Applied Sciences,* Wiley, 2020; 1-20, https://doi.org/10.1002/mma.6947.
20 P. Roul, VMK Prasad Goura: A high-order B-spline collocation scheme for solving a non-homogeneous time-fractional diffusion equation, *Mathematical Methods in the Applied Sciences, Willey,* DOI: 10.1002/mma.6760, 2020.
21. P. Roul, V.M.K.P. Goura, Numerical solution of doubly singular boundary value problems by finite difference method, *Computational and Applied Mathematics*, Springer, 2020, DOI: 10.1007/s40314-020-01344-y.
22. M. Gabeleh, D.K. Patel, P.R. Patle, Darbo type best proximity point (pair) results using measure of noncompactness with application, Accepted in Fixed Point Theory, 2021.
23. N. Vijender, Shape preserving aspects of bivariate alpha-fractal functions, accepted in Fractals, 2021.
24. N. Vijender, Approximation of complex-valued functions by fractal functions, accepted in Advances in Pure and Applied Mathematics, 2021.
25. D. Vasileios and N. Vijender, Univariable Affine Fractal Interpolation Function, accepted in Theoretical and Mathematical Physics, 2021.

26. Singh, V. P., Kirti Sharma, and Debjani Chakraborty. "Solving the shortest path problem in an imprecise and random environment." Sadhana 45.1 (2020): 1-10, Springer.
27. Singh, Vishnu Pratap. "On Solving Linguistic Bi-Level Programming Problem Using Dynamic Programming." International Journal of Fuzzy System Applications (IJFSA) 10.1 (2021): 43-63.
28. Singh, V. P., and Kirti Sharma. "Capacitated Vehicle Routing Problem with Interval Type-2 Fuzzy Demands." Advances in Mechanical Engineering. Springer, Singapore, 2021. 83-89.
29. Sourav Pradhan: "A discrete-time batch transmission channel with random serving capacity under batch-size-dependent service: Geo^X/G^Y_n/1", International Journal of Computer Mathematics: Computer System Theory; 5(3), 175-197, 2020
30. S Pradhan and U C Gupta: "Stationary queue and server content distribution of a batch-size-dependent service queue with batch Markovian arrival process: BMAP/G^{(a,b)}_n/1", Communication in Statistics-Theory and Methods, doi.org/10.1080/03610926.2020.1813304, 2020
31. N Nandy and S Pradhan: "On the joint distribution of an infinite-buffer discrete-time batch-size-dependent service queue with single and multiple vacations", Quality Technology and Quantitative Management, DOI: 10.1080/16843703.2021.1882655, 2021.
32. P. Satapathy, T. Raja Sekhar, and D. Zeidan: "Codimension two Lie invariant solutions of the modified Khokhlov-Zabolotskya-Kuznetsov equation", Math Meth. Appl. Sci. 2020; 1-14, DOI:10.1102/mma.7078.

Invited talks :

- Dr. G. P. Singh delivered a talk on 31st December, 2021 . The talk was organized by VNIT hindi karyanyavan samiti on the topic
- Dr. G. P. Singh chaired a paper presentation session in the International Conference on Research Frontiers in Sciences, ICRFS-2021 organized by G H R C E, Nagpur on 5th February, 2021.
- Prof. Pramod Chakravarthy delivered a talk on "Numerical study of Singular perturbation problems on an adaptive grid", in a webinar on „Mathematics of Fluid Dynamics & Numerical study of Singular Perturbation Problems organized by PVP Siddhartha Institute of Technology, Vijayawada, during 17-18, July 2020.
- Dr. M. Devakar has delivered an invited talk in the "National Webinar on Mathematics of Fluid Dynamics & Numerical Study of Singular Perturbation Problems" on 17th July 2020 Organized by P.V.P .Siddhartha Institute of Technology (Autonomous), Vijayawada.
- Dr. V. P. Singh delivered an invited talk on "Basic Number Theory" on 20th December 2020 Organized by Bajaj Science Center, Wardha.
- Dr. Purnima Satapathy, delivered an invited talk on "Basic Algebra"on 20th December 2020 and 27 December 2020 organized by Bajaj Science Center, Wardha.

Administrative/Additional Responsibilities

Dr. G. P. Singh

Relieved from the charge of Dean (Planning and Development) and he has taken charge of Headship and Chairman, BoS of the Department of Mathematics since 4th January, 2021.

Visiting associate of Inter University Centre for Astronomy and Astrophysics (IUCAA) Pune for three years from 1st August, 2020.

Member of the Board of Studies, Applied Sciences and Humanities, Shri Ramdeobaba College of Engineering and Management, Nagpur since November, 2020.

Member of the Board of Studies, First Year Engineering, S.B.Jain Institute of Technology Management and Research, Nagpur since February, 2021.

Dr. P. Pramod Chakravarthy

Served as a HOD, Mathematics Department from 11-4-2018 to 03-01-2021.

Member in selection committee for faculty recruitments in MHRD funded institutions.

Dr. M. Devakar

Coordinator, M.Sc. Mathematics (Department Level)
Chairman, Online Examination Committee (Department Level)
Coordinator, Grade Verification Committee
Coordinator, OPJEMS 2020 (Institute Level)
Advisor, AXIS 2020, 2021 a Technical Festival of Students at VNIT (Institute Level) Directors' Nominee, Local Purchasing Committee (LPC) (Institute Level) Member, ICC-Sexual Harassment of Women at Work Places (Institute Level)

Dr. Naga Raju Gande

NIRF Coordinator

Dr. rer. nat. Pradip Roul

Professor in charge, Mathematics club
Coordinator, Department Newsletter (Worked till December 2020)
Coordinator, Training and Placement, M.Sc Mathematics
Faculty Advisor, M.Sc Program
Lab in charge, Department of Mathematics
Editorial Board Member for Mathematical Methods in the Applied Sciences, USA, Wiley Publishing

Dr. Deepesh Kumar Patel

Department PhD coordinator

Dr. Sathish Kumar A.

Assignment Coordinator for MAL101 and MAL 102
Member, Convocation committee Member, Board of Studies, MIT Academy of Engineering, Pune.

Dr. Sourav Pradhan

Assignment Coordinator of MAL101, MAL102 (Up to July 2020)
Departmental Time Table Coordinator
Coordinator for Departmental Course Book Up gradation
Member of Store Verification Committee

Dr. V. P. Singh

Professor In-charge of Astronomy Club, VNIT Nagpur
Warden, Hostel Block 2, VNIT Nagpur
Department exam coordinator, Mathematics
Coordinator, Dept. Website Maintenance
Faculty Mentor for the 2020-2021 batch of 1st year B.Tech

Students Achievements

Name	Enrollment No.	GATE/CSIR-NET/ CSIR-JRF	Rank
Praveen Kumar	MS18MTH016	CSIR-JRF	
Bhasker Upadhyay	MS18MTH009	CSIR-NET	
Amya Ranjan Ray	MS18MTH014	GATE	1918
Nikhil Purushottam Zade	MS18MTH031	GATE	546
Bharti Lendey	MS18MTH029	GATE	1623
Shuvranil Sanyal	MS18MTH011	GATE	421
Madhav Singh	MS18MTH020	GATE	1853
Subhasmita Joshi	MS18MTH025	GATE	1853
Satyam Das	MS19MTH017	GATE	3843
Ankit Farkya	MS19MTH006	GATE	

New faculty members introduction:

Dr.Vijender Nallapu has completed Ph.D. at IIT Madras. His current research interests include Fractal Approximation, Splines, and Fractal Numerical Methods. Dr. Vijender joined VNIT in August-2020. Before Joining VNIT, Dr. Vijender served as an assistant professor at IIIT Nagpur and VIT Chennai.

Dr. Purnima Satapathy completed her PhD from IIT Kharagpur in 2019. After PhD, she did one year postdoctoral research from Bar Ilan University, Israel. Her research interests include Lie group analysis, Backlund-Transformation, and Partial differential equations.

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Editorial Team

Dr. Naga Raju Gande & Dr. M. Devakar