About the Department

The Department of Mathematics at BITS Pilani K K Birla Goa Campus was established in 2004. The department has competent faculties with wide knowledge in pure & applied Mathematics. The department offers M.Sc. (Hons) and Ph.D. programs. The average strength in each year is approximately 200 students, spread over 5 years.

The department provides opportunities to the students to choose their career in education and research in various field of Mathematics. Department runs several foundation courses for all students pursuing integrated first degree programs (B.E., M.Sc. (Hons), M.Sc. (Tech)) of the Institute which provides a strong foundation to the various fields of Mathematics that would be essential and useful in both, engineering and sciences. Besides these, the department also offers specialized courses in Mathematics for students pursuing M.Sc. (Hons) and Ph.D. degrees in Mathematics. The department also contributes substantially towards the Work Integrated Learning Programs (WILP) of the Institute, specifically designed for the professionals working in various industries.

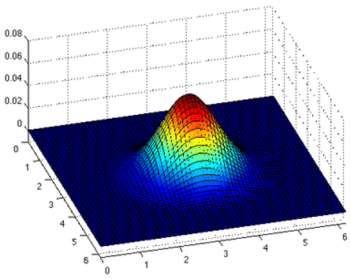
The graduates from the department will have distinguished careers in science and engineering. The track record in this regard, shows that our alumni have occupied leading positions in top ranked industries and premier institutes across the globe.

The department is deeply involved in research and shares the knowledge and transfers it to the academic and industrial sectors through publications, lectures, collaborations, consultations etc

Areas of Research

Analysis & Topology

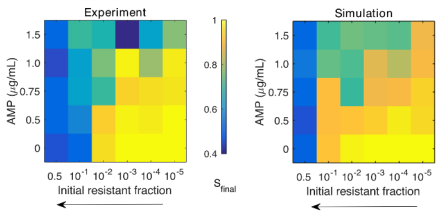
Algebraic Geometry,
Representation Theory
Combinatorics
Commutative Algebra
Diophantine Equations
and Approximations
Analytic Number
Theory



Number Theory & Cryptography

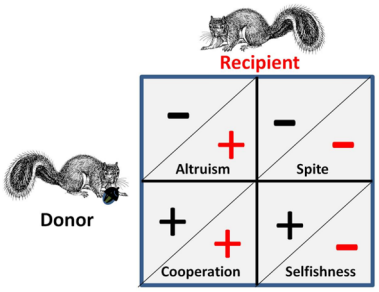
Mathematical Biology

Modelling & Simulations
Dynamical systems
Stochastic Process
Theoretical Biology
Evolutionary Games

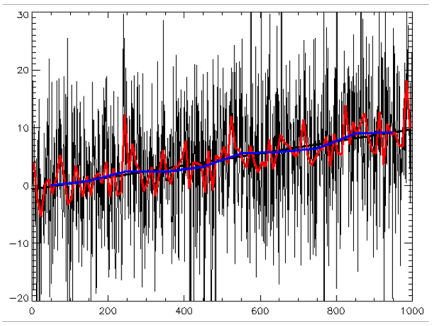


Differential Equations & Applications

Optimal Control Theory
Nonlinear Hyperbolic
PDEs
Singular Integral
Equations
Wavelet Based
Numerical Methods
Finite Element Method
Virtual Element Method



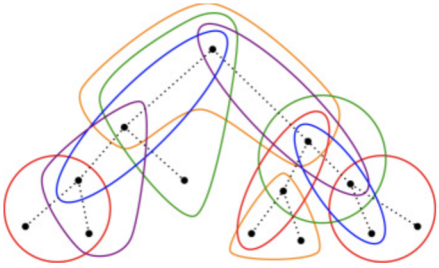
Numerical Methods & Applications



Financial Mathematics

Linear & Multi Linear Algebra

Portfolio Optimization
Problems
Numerical Linear Algebra
Tensor Algebra
Machine Learning
Combinatorial Testing



Discrete Mathematics

Department of Mathematics
BITS Pilani, K K Birla Goa Campus

Ph.D. (Full-Time) program in Mathematics

About the campus

Birla Institute of Technology & Science (BITS), Pilani, a leading Institute of higher education and a deemed University under section-3 of the UGC act, offers a wide range of Bachelor, Master, and Ph.D. programs in Engineering, Sciences, Technology, Pharmacy, Management, and Humanities. With an illustrious legacy, modern campuses, and alumni in leadership positions worldwide, BITS Pilani has been the institute of choice for top students year after year.

About the department

The Department of Mathematics, BITS Pilani, K K Birla Goa Campus has a seventeen-year tradition of conducting excellent research, spanning a wide range of subjects in pure and applied mathematics. The department offers a full-time Ph.D. program in Mathematics, which is open for M.Sc. or equivalent degree students with a minimum of 60% marks in the qualifying examination.

Objective of the course

The main objective of the doctoral program is to create scholarly responsibility among researchers and provide them with an intellectually stimulating environment for focused research. The study phase of the research includes a solid foundation in advanced mathematics with a particular sequence of courses designed to enhance the professional ability of the candidates.

Preferred research areas

Linear Algebra, Numerical Analysis, Graph Theory, Control Theory, Operator Theory, Complex Analysis, Topology & Geometry, Functional Analysis, Fracture Mechanics, Harmonic & Wavelet Analysis, Number Theory & Cryptography, Financial Mathematics, Algebra, Theoretical and Computational Differential Equations, Mathematical Modelling, Discrete Mathematics.

Program requirements

M. Sc. In Mathematics or equivalent degree with 60% aggregate. Shortlisted candidates will have to appear for a written test and/or interview. Candidate having NET/GATE/M. Phil/JRF will be exempted from the written test.

Financial assistance

- M.Sc. or equivalent: ₹ 28,000 per month. After qualifying, the coursework through examinations, the scholarship will increase to ₹ 31,000 per month.
- M.Phil./M. Tech./JRF: ₹ 31,000 per month.
- The higher fellowship may be made available in subsequent years subject to the institute norms and performance of the candidates.

Department of Mathematics is ranked in the top 451-500 QS World University Subject Ranking.

Deadline: July 05, 2022

Apply through: https://www.bitsadmission.com/phdmain.aspx

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innovate achieve lead

Dr. Amit Setia

Associate Professor

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"My current research group is currently focusing on numerical methods to solve hypersingular integral equations as well as control problems in robotics and biological sciences"

Area of Interest: Wavelet Based Numerical Methods; Singular Integral Equations; Control Problems

In recent years, we have implemented

- Haar wavelet based numerical methods to solve nonlinear fractional differential equations with its application to various areas like chemical engineering, epidemiological models.
- Legendre polynomial based numerical method to solve Cauchy singular and hypersingular integral equations with its application to crack problems

On-going research activities:

Presently, I am working in the following areas:

- To develop Haar wavelet based numerical methods to solve control problems in the area of robotics, biological sciences etc.

Latest publications:

1 V Sharma, A Setia, Approximate solution and its convergence Analysis for Hypersingular Integral equations, *Defence Science Journal*, 69 (2019), 173-178.

2 V Sharma, A Setia, Numerical solution and its analysis for a system of hypersingular integral equations, *Journal of Computational and Applied Mathematics*, 343 (2018) 520-538.

3 V Sharma, A Setia, R P Agarwal, Numerical solution for system of Cauchy type singular integral equations with its error analysis in complex plane, *Applied Mathematics and Computation*, 328 (2018) 338-352.

4 B Prakash, A Setia, D Alapatt, Numerical solution of nonlinear fractional SEIR epidemic model by using Haar wavelets, *Journal of Computational Science*, 22 (2017) 109-118.

5 B Prakash, A Setia, S Bose, Numerical solution for a system of fractional differential equations with applications in Fluid dynamics and Chemical Engineering, *International Journal of Chemical Reactor Engineering,*15 (2017) 2017-0093.

Dr. Anil Kumar

Associate Professor

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"My research group currently working on theoretical and numerical aspects of the optimal control problems"

Area of Interest: Optimal Control Theory; Ordinary and Partial Differential Equations; Finite Element Method; Virtual Element Method

The research comprises the optimal control problems for linear and nonlinear partial differential equations and their applications, emphasizing theory and computation. The concept of controllability denotes the ability to move a system around in its entire configuration space using only specific admissible manipulations. The time-optimal control problem under consideration consists of finding control in an admissible set that minimizes the particular cost functional.

On-going research activities:

Presently, I am working in the following areas:

- Theoretical and numerical study of the Control problems involving differential equations with a memory term.
- Numerical approximation of optimal control problems involves partial differential equations by the virtual element method (VEM), a recently developed technique.
- Application of optimal control theory in software reliability growth modelling.

Latest publications:

1. Tushar J., Kumar, A. & Kumar, S. (2022). Variational and Virtual Discretizations of Optimal Control Problems Governed by Diffusion Problems. *Applied Mathematics and Optimization*, 85(2), 1-36.
2. Pradhan, S. K., Kumar, A., & Kumar, V. (2021). An Optimal Resource Allocation Model Considering Two-Phase Software Reliability Growth Model with Testing Effort and Imperfect Debugging. *Reliability: Theory & Applications*, (SI 2 (64)), 241-255.
3. Dhayal, R., Malik, M., Abbas, S., Kumar, A., & Sakthivel, R. (2021). Approximation theorems for controllability problem governed by fractional differential equation. *Evolution Equations & Control Theory*, 10(2), 411.
4. Kumar, B. S., Danumjaya, P., & Kumar, A. (2019). A fourth-order orthogonal spline collocation method to fourth-order boundary value problems. International Journal for Computational Methods in Engineering Science and Mechanics, 20(5), 460-470

Dr. Anupama Sharma

Assistant Professor

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"My primary research interest is mathematical modelling of complex systems"

Area of Interest: Mathematical Modelling; Mathematical Biology

My group works at the interface of Mathematics with Biology. We focus primarily on modeling the transmission of infectious disease and population dynamics of microbial communities, using concepts of dynamical systems and stochastic processes.

On-going research activities:

Current focus of research in my group is:

- Modelling the population dynamics of recurrent infectious diseases such as, Influenza and Dengue. To understand the factors giving rise to these seasonal outbreaks, we formulate stochastic models and analyze them using techniques from dynamical systems and perturbation theory.
- Developing algorithms capable of detecting/predicting a dynamical regime shift in noisy incidence data using data assimilation schemes..

Latest publications:

1. Anupama Sharma, Kevin B. Wood, Spatial segregation and cooperation in radially expanding microbial colonies under antibiotic stress, The ISME Journal, https://doi.org/10.1038/s41396-021-00982-2 (2021).
2. J. Deshmukh, R.P. Subbanarasimha, P. Bassin, V.S. Bitra, S. Srinivasa, Anupama Sharma, An interactive simulator for COVID-19 trend analysis, CODS COMAD 2021: 8th ACM IKDD CODS and 26th COMAD, 385–389, doi.org/10.1145/3430984.3430989, 2021
3. Anupama Sharma, Quantifying the effect of demographic stochasticity on the smoking epidemic in the presence of economic stimulus, Physica A, doi: 10.1016/j.physa.2020.124412 (2020).
4. Anupama Sharma, Shakti N. Menon, V. Sasidevan, Sitabhra Sinha, Epidemic prevalence information on social networks can mediate emergent collective outcomes in voluntary vaccine schemes, PLoS Computational Biology, 15(5): e1006977 (2019).

Dr. Anushaya Mohapatra

Assistant Professor

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"My Current research focused on evolutionary game dynamics of migratory populations"

Area of Interest: Mathematical Biology; Dynamical systems

My research work is on derivation and analysis of population models and evolutionary dynamics. I use dynamical system theory applied to difference equations and ordinary differential equations to advance the understanding of biological systems especially behaviours of bird/animals. On theoretical side, I am also interested in time-dependent dynamical systems and its statistical properties.

On-going research activities:

My current research focuses on understanding partial migration behaviour of animal and bird spices and the effect of environmental fluctuations on it.

Latest publications:

1. Mohapatra, A., & De Leenheer, P. (2021). The ideal free distribution and the evolution of partial migration. *Journal of Difference Equations and Applications,* 27(3), 462-477.
2. Ohms, H. A., Mohapatra, A., Lytle, D. A., & De Leenheer, P. (2019). The evolutionary stability of partial migration under different forms of competition. *Theoretical Ecology*, 12(3), 347-363.
3. De Leenheer, P., Mohapatra, A., Ohms, H. A., Lytle, D. A., & Cushing, J. M. (2017). The puzzle of partial migration: adaptive dynamics and evolutionary game theory perspectives. *Journal of theoretical biology*, 412, 172-185.
4. Mohapatra, A., Ohms, H. A., Lytle, D. A., & De Leenheer, P. (2016). Population models with partial migration. *Journal of Difference Equations and Applications,* 22(2), 316-329.

Dr. P. Danumjaya

Associate Professor

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"My research group currently focusses on Theoretical and Numerical Study of Real Life Applications"

Area of Interest: Numerical Analysis; Computational PDEs; Mathematical Biology

The research comprises Theoretical and Numerical study of Differential Equations using Finite Element Methods and Orthogonal Spline Collocation Methods. We are also working on Modeling and studying the dynamics between Diabetes Mellitus and Tuberculosis disease.

On-going research activities:

Currently research is focused on three main areas:

- Developing Orthogonal Spline Collocation Methods to Interface problems with discontinuous data
- Decay estimates of Weakly / Strongly damped wave equation using Finite Element Methods
- Modeling perspective of Diabetes Mellitus with Tuberculosis

Latest publications:

1. P. Danumjaya, Santosh Kumar Bhal and Graeme Fairweather (2021), The Crank-Nicolson orthogonal spline collocation method for one-dimensional parabolic problems with interfaces, J. Comput. Appl. Math. 383, pp. 1-10.
2. P. Danumjaya and Monalisa Anand, (2021), Modeling Perspective of Diabetes Mellitus with Tuberculosis, J. Innovation Sciences and Sustainable Technologies. 1(2), pp. 119 - 138.
3. P. Danumjaya, Santosh Kumar Bhal and Graeme Fairweather (2020), A Fourth-Order Orthogonal Spline Collocation Method for Two-Dimensional Helmholtz Problems with Interfaces, Numer. Methods Partial Differential Eq., 36, pp. 1811-1829.
4. P. Danumjaya, Santosh Kumar Bhal and Graeme Fairweather (2020), High-Order Orthogonal Spline Collocation Methods for Two-Point Boundary Value Problems with Interfaces, Math. Comput. Simulation, 174, pp. 102-122.

Dr. Gunja Sachdeva

Assistant Professor

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"My research currently focusses on spectral analogs of the classical strong multiplicity one theorem for newforms"

Area of Interest: Algebraic Number Theory; Representation Theory; Algebra and Geometry

My mathematical research interests are in the field of Automorphic representations and their L-functions, in particular, special values of L-functions using analytic techniques from the Langlands program and geometric techniques involving the cohomology of locally symmetric spaces. I am also interested in Representation Theory of Lie Groups, in particular, spectral theory of Differential operators on locally symmetric spaces.

Latest publications:

1. Harald Grobner and Gunja Sachdeva, Relations of rationality for special values of Rankin-Selberg L-functions of GL(n) x GL(m) over CM-fields, Pacific Journal of Mathematics, Volume 308, pp. 281-305(2020).
2. Gunja Sachdeva, Critical values of L-functions for GL(3) x GL(1) and symmetric square L-functions for GL(2) over a CM field, Journal of Number Theory, Volume 211, pp. 43-74 (2020).
3. A. Raghuram, and Gunja Sachdeva, Critical values of L-functions for GL(3) x GL(1) over a totally real field, L-functions and Automorphic forms, 195-230, Contrib. Math. Comp. Sci., 10, Springer, Cham (2017).

Dr. Himadri Mukherjee

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"Combinatorial commutative algebra and related topics is my focus of research"

Area of Interest: Combinatorics, Commutative Algebra; Linear Algebra; Algebraic Geometry

My main focus is on the combinatorial aspects of commutative algebra and related algebraic geometry, but I am also interested in the broad area of Combinatorics.

On-going research activities:

Free resolution of Hibi Ideals, Non-singular subspaces of matrices, Hamiltonian cycles in graphs, preserver problems in linear algebra.

Latest publications:

1. Dhorajia, A. M., & Mukherjee, H. (2018). Polynomial rings over commutative reduced Hopfian local rings. Acta Mathematica Hungarica, 154(1), 243-251.
2. Mukherjee, H. (2019). Hamiltonian cycles of power graph of abelian groups. Afrika Matematika, 30(7), 1025-1040.
3. Lakshmibai, V., & Mukherjee, H. (2007). Singular loci of Hibitoric varieties. Ramanujan Math. Journal, 26(1), 1-29
4. First syzygy of Hibi rings associated with planar distributive lattices, with P. Das, Acta Mathematica Vietnamica, to appear.

Dr. Jajati K. Sahoo

Associate Professor

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"My research group focus on studying characterization of generalized inverses and its application in solving linear and multilinear systems"

Area of Interest: Linear Algebra; Numerical Linear Algebra; Tensor Algebra; Machine Learning

We focus on the convergence of iterative methods for solving linear or multilinear systems Ax=b, where A can be considered as a matrix or tensor depending on the physical problem. In particular, when the coefficient matrix is singular or rectangular, then the usual inverse does not exist. To overcome this problem, the generalized inverse has been extensively studied and used in solving the system or multilinear system.

On-going research activities:

Presently, we are working in the following areas:

- Characterization of generalized inverses such as Moore-Penrose, Drazin, Core-EP inverse.
- Alternating iterative schemes for singular and non-singular systems.
- Numerical solution of multilinear system based on different tensor products.
- Application of machine learning models to finance data.

Latest publications:

1. R. Behera, J.K. Sahoo, R.N. Mohaptra, M. Zuhair Nashed, Computation of Generalized Inverses of Tensors via t-Product, Numerical Linear Algebra with Applications, 2021.
2. P. Ghosh, A. Neufeld, J.K. Sahoo, Forecasting directional movements of stock price for intraday trading using LSTM and random forests, Finance Research Letters, 2021.
3. A. K. Nandi, J.K. Sahoo, Regularized iterative method for ill-posed linear system based on matrix splitting, FILOMAT, Vol 35 (4), 2021.
4. P. S. Stanimirovic, J.R. Sendra, R. Behera, J.K. Sahoo, Dijana Mosic, J. Sendra, A. Lastra, Computing tensor generalized inverses via specilization and rationalization, Revista de la Real Academia de Ciencias Exactas, Fisicas y Naturales - Serie A: Matematicas (RACSAM), 2021.

Dr. Manoj K. Pandey

Associate Professor

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"My research group focuses on the analytical study of hyperbolic system of PDEs"

Area of Interest: Nonlinear Hyperbolic PDEs; Lie Group of Transformations and Wave Interactions

Research compromises of using Lie symmetry analysis Hyperbolic system of PDEs to study the interaction of elementary waves.

On-going research activities:

Current research is on:

- Constructing conservation laws for hyperbolic system of PDEs.
- Interaction of elementary waves for hyperbolic PDEs.

Latest publications:

1. Pradhan, P. K., & Pandey, M. (2019). Lie symmetries, one-dimensional optimal system and group invariant solutions for the Ripa system. International Journal of Nonlinear Sciences and Numerical Simulation, 20(6), 713-723.
2. Pradhan, P. K., & Pandey, M. K. (2020). Symmetry analysis and optimal systems of generalized Chaplygin gas equations with a source term. Mathematical Methods in the Applied Sciences, 43(9), 6081-6092.
3. Govekar, S., Pradhan, P. K., & Pandey, M. (2020). Evolution of Contact and Weak Discontinuity Waves in Two Phase Drift Flux Model. International Journal of Applied and Computational Mathematics, 6(5), 1-10.
4. Zeidan, D., Govekar, S., & Pandey, M. (2021). Discontinuity wave interactions in generalized magnetogasdynamics. Acta Astronautica, 180, 110-114.

Dr. Mayank Goel

Assistant Professor

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"My research group is focused on continuous time mathematical models in finance"

Area of Interest: Stochastic Modelling; Stochastic Control Theory; Portfolio Optimization Problems

The research comprises of developing stochastic models for institutional investors/ fund managers with an objective to maximize his/her expected returns for a given risk arising under the different economic conditions. Securities may include equities, fixed income securities, and illiquid assets.

On-going research activities:

Current research is focused on two main aspects

- Developing stochastic model to beat a stochastic benchmark, which is capable to capture the nonlinear dynamics of assets and economic factors in the market. Perform simulation to check the suitability of nonlinear dynamics under S&P and Dow Jones index.
- Portfolio optimization when one of the asset is illiquid, which is available for trade only at random time.

Latest publications:

1. Samanta, G. C., Goel, M., & Myrzakulov, R. (2018). Strength of the singularities, equation of state and asymptotic expansion in Kaluza-Klein space time. New Astronomy, 60, 74-79.
2. Sahoo, J. K., & Goel, M. Portfolio Risk Management Using Signed Graphs Proceedings of International Conference on Computational Physics, Mathematics and it's Applications (ICCPMA), Tokyo, Japan, 2016, 109-117.
3. Sahoo, J. K., & Goel, M. Estimation of Learning Function from Sparse Data Using Optimization Technique, Proceedings of 4th Intl Conference on Advances in Engineering Sciences and Applied Mathematics, Kuala Lumpur Malaysia, , 2015, 5-9.
4. Ravi Shankar, Mayank Goel, “Risk-sensitive benchmarked portfolio optimization under non-linear market dynamics”, communicated.

Dr. Minhajul

Assistant Professor

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"My research currently focuses on the analytical study of wave interaction problems associated with hyperbolic system of conservation laws"

Area of Interest: Partial Differential Equations; Hyperbolic System of Conservation Laws; Riemann Problem; Wave Interactions

A large number of physical phenomena are modelled by system of quasilinear first order partial differential equations (PDEs) that result from the balance laws of continuum physics. These equations, expressed in terms of divergence, are commonly called conservation laws. My research comprises of the study of wave interactions problems associated with hyperbolic system of conservation laws which gives essential feature of the solution with rich geometric structure. We mainly investigate the solution of the Riemann problem and use this solution to study the wave interactions for various practical problems to understand the large time behaviour of the solution.

On-going research activities:

Presently, I am working on the wave interactions problem involving delta shock wave associated with hyperbolic system of conservation laws.

Latest publications:

1. Minhajul and T. Raja Sekhar (2021), Nonlinear wave interactions in a macroscopic production model, Acta Mathematica Scientia (Springer), 41B(3), 764–780.
2. Minhajul and T. Raja Sekhar (2019), Interaction of elementary waves with a weak discontinuity in an isothermal drift-flux model of compressible two-phase flows, Quarterly of Applied Mathematics (American Mathematical Society), 77(3), 671–688.
3. Minhajul, T. Raja Sekhar and G. P. Raja Sekhar (2019), Stability of solutions to the Riemann problem for a thin film model of a perfectly soluble anti- surfactant solution, Communications on Pure and Applied Analysis (American Institute of Mathematical Sciences), 18(6), 3389–3408.
4. Minhajul, D. Zeidan and T. Raja Sekhar (2018), On the interactions in the drift-flux equations of two-phase flows, Applied Mathematics and Computations (Elsevier), 327, 117–131.

Dr. Monojit Bhattacharjee

Assistant Professor

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"My primary research interest is to characterize abstract class of operators in terms of shift operators on function spaces over several domains"

Area of Interest: Functional Analysis; Operator Theory

I am working in the intersection of Operator Theory and Functional Analysis. My research concerns with different topics in Multi-Variable Operator Theory including dilation theory and reproducing kernel Hilbert spaces.

On-going research activities:

Currently, I am interested to characterize n-tuples of commuting contractions which can be dilated to n-tuples of commuting isometries having BCL type representations and also to characterize n-tuples commuting contractions which can be realized as a part of weighted multi-shift operators on function spaces over domains in C^n.

Latest publications:

1. M. Bhattacharjee and B.K. Das, Factors of Hypercontractions, Journal of Operator Theory (2021), 85(2), 443-462.
2. M. Bhattacharjee, Kalpesh J. Haria and J. Sarkar, Commuting row contractions with polynomial characteristic functions, to appear in Acta Sci. Math.
3. M. Bhattacharjee, B.K. Das, R. Debnath and J. Sarkar, Beurling quotient modules on the polydisc, to appear in Journal of Functional Analysis.
4. M. Bhattacharjee, B.K. Das and J. Sarkar, Hypercontractions and Factorization of multipliers in one and several variables, submitted.
5. M. Bhattacharjee, S. Barik and B.K. Das, Commutant lifting in several variables, submitted.

Dr. Prabal Paul

Assistant Professor

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"My research group is focused on Number Theory and Cryptography"

Area of Interest: Number Theory, Coding Theory, Cryptography

I am working on Additive Number Theory and Combinatorial Number Theory, Cryptography and Coding Theory.

Latest publications:

1. Chintamani, Mohan N.; Paul, Prabal, On some weighted zero-sum constants II. Int. J. Number Theory, 14 (2018), no. 2, 383–397.
2. Chintamani, M. N.; Paul, Prabal; Thangadurai, R. On short zero-sum sequences over abelian p-groups. Integers, 17 (2017), Paper No. A50, 10 pp.
3. Chintamani, Mohan N.; Paul, Prabal On some weighted zero-sum constants. Int. J. Number Theory, 13 (2017), no. 2, 301–308.
4. Paul, Prabal Counting zero-free sequences. J. Comb. Number Theory, 7 (2015), no. 2, 131–139.

Dr. Pradeep Boggarapu

Assistant Professor

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"My primary research interest is Harmonic Analysis in Dunkl Setup and Harmonic Analysis on Euclidean spaces''

Area of Interest: Harmonic Analysis (Broadly).Focused on research problems with the underlying space either Euclidean or Heisenberg group.

The main theme of my research work is mixed normestimates for certain operators associated to the Dunkl-Hermite expansions and chaotic behaviour of heat semigroups associated with Dunkl Laplacian. I also work on inequalities like Hardy's inequalities, Strichartz inequality associated with some important operators in Harmonic analysis.

On-going research activities:

- Generalized Strichartz estimates for orthonormal families of Initial data for Schrodinger equation and wave equation associated with DunklLaplacian.
- Study on summability methods for Dunkl-Hermite expansion on L^p spaces associated to general Coxeter groups on higher dimensional Euclidean spaces.
- Study on Dunkl-Hermite multipliers.

Latest publications:

1. Balhara R., Boggarapu P., Thangavelu S. (2021). An Extension Problem and Hardy Type Inequalities for the Grushin Operator. In: Ciatti P., Martini A. (eds) Geometric Aspects of Harmonic Analysis. Springer INdAM Series, vol 45. Springer, Cham.
2. B. Pradeep, Luz Roncal and S. Thangavelu. On extension problem, trace Hardy and Hardy's inequalities for some fractional Laplacians. Comm. on Pure and Applied Analysis, 18 (2019), no. 5, 2575–2605.
3. B. Pradeep, Luz Roncal and S. Thangavelu. Mixed norm estimates for the Ces\`{a}ro means associated with Dunkl-Hermite expansions. Trans. Amer. Math. Soc. 369 (2017), 7021-7047.
4. B. Pradeep and S. Thangavelu. On the chaotic behavior of the Dunkl heat semigroup on weighted L^p spaces. Israel J. Math., 217 (2017), 57-92.

Dr. Prasanna Kumar

Associate Professor

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"My research group currently working on the location of zeros, critical points and the growth of complex polynomials in a disc"

Area of Interest: Geometric Function Theory

My current research work involves the study geometry of complex polynomials. Even though the topic is geometric in flavor, but we explore byways that come from real/complex analysis, algebra and other parts mathematics.

On-going research activities:

Presently, I am working in the following areas:

- Bernstein-type inequalities for polynomials and rational functions
- Location of zeros of polynomials
- Geometry of polar derivative of polynomials

Latest publications:

1. Kumar, P. (2020). On the inequalities concerning polynomials. Complex Analysis and Operator Theory, 14(6), 1-11.
2. Dhankhar, R., Govil, N. K., & Kumar, P. (2020). On sharpening of inequalities for a class of polynomials satisfying p(z)≡ znp(1/z). Studia Scientiarum Mathematicarum Hungarica, 57(2), 255-266.
3. Kumar, P., &Dhankhar, R. (2020). Some refinements of inequalities for polynomials. Bulletin Mathematique De La Societe Des Sciences Mathematiques De Roumanie, 63(4), 359-367.
4. Govil, N. K., & Kumar, P. (2019). On sharpening of an inequality of Turán. Applicable Analysis and Discrete Mathematics, 13(3), 711-720.
5. Kumar, P. (2019). Some integral inequalities for the polar derivative of polynomials. Publications de l'Institut Mathematique, 106(120), 85-94.

Dr. Saranya G Nair

Assistant Professor

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"My research area is number theory"

Area of Interest: Diophantine Equations and Approximations; Analytic Number Theory; Algebraic Properties of Classical Polynomials

My research interests are in Diophantine equations and approximations, analytic number theory, algebraic properties of classical polynomials, Galois group problems and computational number theory. The estimates on the greatest prime factor of product of consecutive positive integers and more generally, of consecutive terms in arithmetic progressions have several applications. In particular, I am working on improving these estimates to establish the irreducibility of Generalised Laguerre Polynomials over rationals. I also work in the field of Diophantine equations.

Latest publications:

1. Laishram, S., Nair, S. G., & Shorey, T. N. (2020). Irreducibility of extensions of Laguerre Polynomials. Functiones et Approximatio Commentarii Mathematici, 62(2), 143-164.
2. Shorey, T. N., G Nair, S., & Laishram, S. (2020). On the Galois group of Generalised Laguerre polynomials II. Hardy-Ramanujan Journal, 42.
3. Nair, S. G., & Shorey, T. N. (2018). Irreducibility of generalized Laguerre polynomials $ L_n^{(1/2+ u)}(x^ 2) $ with $-18\leq u\leq-2$. Acta Arithmetica, 184, 363-383.
4. Nair, S. G., & Shorey, T. N. (2016). Lower bounds for the greatest prime factor of product of consecutive positive integers. Journal of Number Theory, 159, 307-328.

Dr. Shilpa Gondhali

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"Algebraic Topology"

Area of Interest: Vector Field Problem

My current research work involves attempting to solve vector field problem on manifolds by computing invariants such as cohomology, (topological) K ring, etc.

Latest publications:

1. Das, A., Gondhali, S., & Mukherjee, G. (2019). Nambu structures on Lie algebroids and their modular classes. Proceedings-Mathematical Sciences, 129(4), 1-36.
2. Gondhali, S. (2020). The complex K^* K_* ring of the complex projective Stiefel manifold. Journal of Algebraic Combinatorics, 51(3), 455-468.

Dr. Tarkeshwar Singh

Professor

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"My primary research interest is Graph Theory"

Area of Interest: Labeling of Graphs/Signed Graphs; Energy of Graphs; Domination in Graphs

I work on Graph Labeling Problems specifically Graceful and Skolem Graceful Labeling of Signed Graphs, Hypergraceful Graphs, Distance Magic Graphs and Distance Antimagic Graphs.

On-going research activities:

Current focus of my research is Distance Magic and Distance Antimagic Graphs, Local Antimagic Coloring of Graphs, Majority and Roman Domination of Graphs, CD-Chromatic Number of Graphs.

Latest publications:

1. Godinho, A., Singh, T., & Arumugam, S. (2018). The Distance Magic Index of a Graph. Discussiones Mathematicae: Graph Theory, 38(1).
2. Singh, D. R., Singh, M. K., Singh, T., & Prasad, R. (2018). Genetic algorithm for solving multiple traveling salesmen problem using a new crossover and population generation. Computacióny Sistemas, 22(2), 491-503.
3. Rao, S. B., Sampathkumar, E., Singh, T., Acharya, B. D., & Acharya, M. (2018). Saturated Edge Coverings of Graphs. Indian J. Discrete Math, 4(1), 1-6.
4. Pereira, J., Singh, T., & Arumugam, S. (2020). Edge consecutive gracefulness of a graph. Discrete Applied Mathematics, 280, 214-220.

Dr. Yasmeen Akhtar

Assistant Professor

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"I am currently working on Construction and Analysis of Covering, Locating and Detecting Arrays"

Area of Interest: Combinatorial Testing; Supersaturated Designs

Combinatorial Testing based on covering array is practical approaches that produces high quality testing at lower cost, and have significant applications in software engineering. We are working on generalization of combinatorial testing designs for screening purposes.

On-going research activities:

Presently, I am working in the following areas:

- Developing approximation algorithm for an NP-hard problem of finding an optimal size covering array on hypergraph.
- Investigation of locating arrays in screening experiments.
- Algebraic construction of mixed covering, locating, and detecting.

Latest publications:

1. Akhtar, Y., & Phoa, F. K. H. (2020). Cost-Efficient Mixed-Level Covering Designs for Testing Experiments. Journal of Statistical Theory and Practice, 14(1), 1-18.
2. Maity, S., Akhtar, Y., Chandrasekharan, R. C., & Colbourn, C. J. (2018). Improved strength four covering arrays with three symbols. Graphs and Combinatorics, 34(1), 223-239.
3. Akhtar, Y., & Maity, S. (2017). Mixed covering arrays on 3-uniform hypergraphs. Discrete Applied Mathematics, 232, 8-22.
4. Akhtar, Y., & Maity, S. (2017). Covering arrays on product graphs. Graphs and Combinatorics, 33(4), 635-652.