Aiyappan S

Assistant Professor, Department of Mathematics

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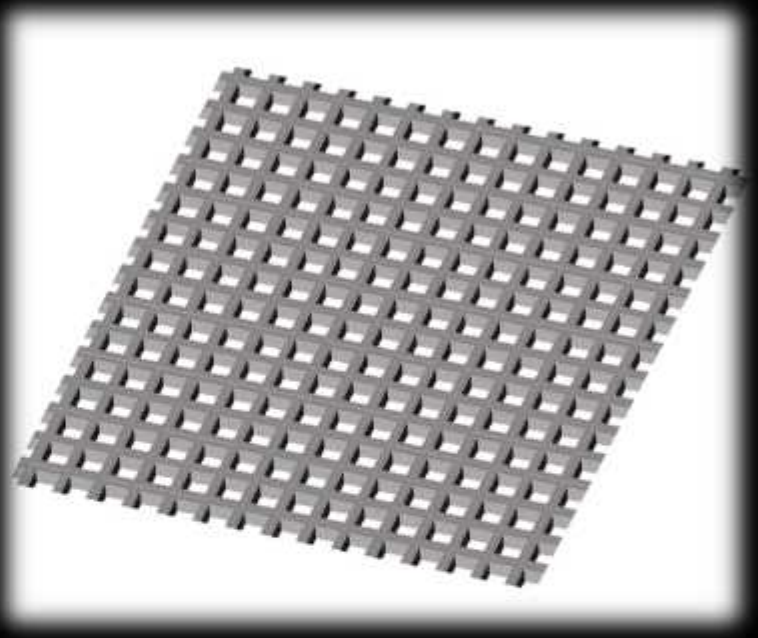
Major Areas of Research

Homogenization
Theoretical PDE
Asymptotic Analysis



Major Research Facilities in the Group

Functional Analysis

Most significant Publications

1. S. Aiyappan, K. Pettersson: Homogenization of a locally periodic oscillating boundary. Appl. Math. Optim. 86 (2022), no. 2, Paper No. 14, 34 pp.

2. S. Aiyappan, A. K. Nandakumaran, Ravi Prakash: Semi-linear optimal control problem on a smooth oscillating domain. Commun. Contemp. Math. 22 (2020), no. 4, 1950029, 26 pp

3. S. Aiyappan, A. K. Nandakumaran, Ravi Prakash: Generalization of unfolding operator for highly oscillating smooth boundary domains and homogenization. Calc. Var. Partial Differential Equations 57 (2018), no. 3, Paper No. 86, 30 pp.

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Amit Tripathi

Assistant Professor, C-442, Department of Mathematics

Phone No: +91-40-23016611 , Institute Email: amittr@math.iith.ac.in

Webpage Link: https://sites.google.com/site/amittr/home

Major Areas of Research

Algebraic geometry and commutative algebra

Major Research Facilities in the Group

Theoretical work

Technology/Product Developed

Theoretical work

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Arunabha Majumdar

Assistant Professor, Department of Mathematics

Email: arun.majum@math.iith.ac.in; Webpage link: Biostatistics Lab @ IITH (google.com)

Major Areas of Research

Statistical genomics, biostatistics, computational statistics

Major Research Facilities in the Group

Rigorous training in applied statistics, cloud computing access to UK Biobank, access to institute's computing servers

R software packages developed for genomic data analysis

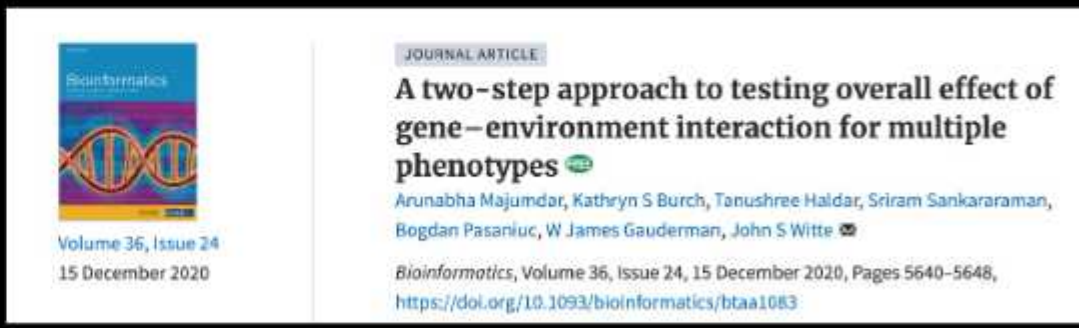
CPBayes, eGST, MPGE

Biometrics JOURNAL OF THE INTERNATIONAL BIOMETRIC SOCIETY

Original Article

A Novel Bayesian Semiparametric Algorithm for Inferring Population Structure and Adjusting for Case-Control Association Tests

Arunabha Majumdar, Sourabh Bhattacharya, Analabha Basu, Saurabh Ghosh



Volume 36, Issue 24
15 December 2020

JOURNAL ARTICLE

A two-step approach to testing overall effect of gene–environment interaction for multiple phenotypes

Arunabha Majumdar, Kathryn S Burch, Tanushree Haldar, Sriram Sankararaman, Bogdan Pasaniuc, W James Gauderman, John S Witte

Bioinformatics, Volume 36, Issue 24, 15 December 2020, Pages 5640–5648, https://doi.org/10.1093/bioinformatics/btaa1083

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Balasubramaniam Jayaram

Professor, Department of Mathematics

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Major Areas of Research/Up to 3 major sponsored projects

- Approximate Reasoning
- Operations in Multi-valued Logic
- Role of Distances in High Dimensions

- S. Kumari and B. Jayaram, " Measuring Concentration of Distances - An Effective and Efficient Empirical Index " , *IEEE Transactions on Knowledge and Data Engineering*, 29(2) , pp. 373 - 386, 2017.

- M. Baczyński, B. Jayaram, S. Massanet, J. Torrens, " Fuzzy Implications: Past, Present, and Future", in: *J. Kacprzyk, W. Pedrycz (Eds.),* Springer Handbook of Computational Intelligence , Springer, Berlin Heidelberg, pp. 183 - 202, 2015.

- B. Jayaram and F. Klawonn, " Can unbounded distance measures mitigate the curse of dimensionality? " , *Int. Jl. of Data Mining, Modelling and Mgmt.* , 4 (4), pp. 361 - 383, 2012 .

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
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Bhakti Bhusan Manna

Assistant Professor, Department of Mathematics

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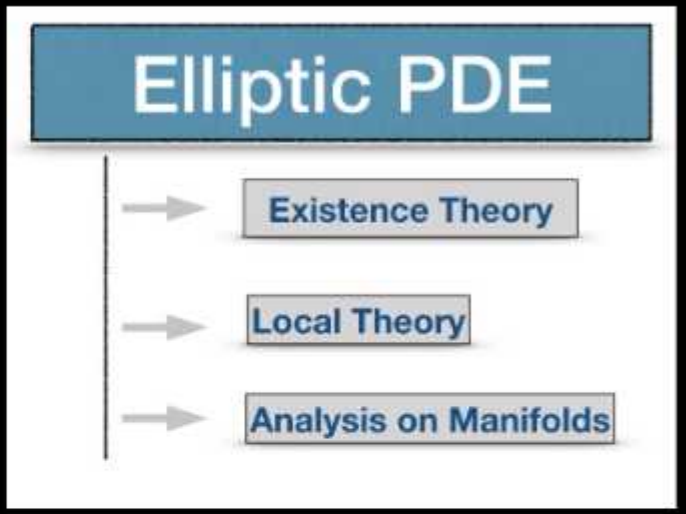
Major Areas of Research/Up to 3 major sponsored projects

- Nonlinear Partial Differential Equations
- Variational Methods
- Geometric Analysis



Most significant Publications

1. Manna, B. B.; Ruf, Bernhard; Sahoo, A. K.; Srikanth, P. N. Hopf reduction and orbit concentrating solutions for a class of superlinear elliptic equations. *J. Funct. Anal.* 282 (2022)

2. Sahoo, Alok K.; Manna, Bhakti B. Existence of sign-changing solutions to a Hamiltonian elliptic system in R^N. J. Math. Anal. Appl. 517 (2023)

3. Clapp, Mónica; Manna, Bhakti Bhusan Double- and single-layered sign-changing solutions to a singularly perturbed elliptic equation concentrating at a single sphere. *Comm. Partial Differential Equations* 42 (2017)

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
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Deepak Kumar Pradhan

Asst Professor, Lab Name, Department of Mathematics

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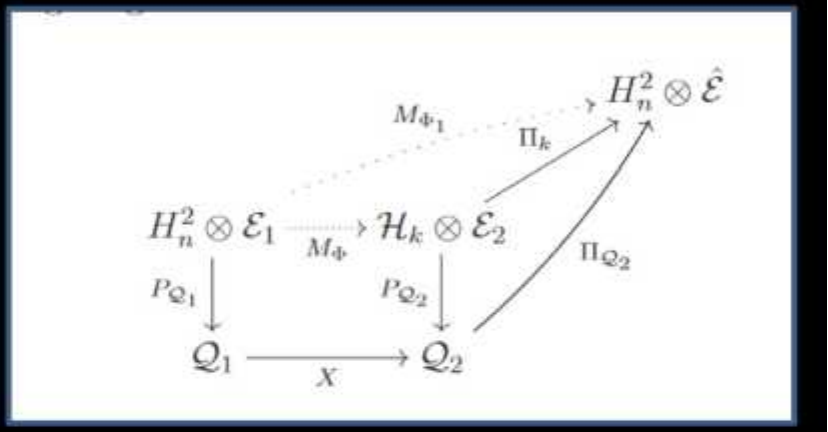
Major Areas of Research

Operators on Reproducing kernel Hilbert spaces,
Multivariable operator theory, Functions in complex variables.



INSPIRE Faculty Fellow Research Grant: Interpolation problems in reproducing kernel Hilbert Spaces.

Some Significant Publications

1. Multishifts on directed Cartesian products of rooted directed trees. *Dissertationes Math.* 527 (2017), 102 pp.
2. Commutant lifting and Nevanlinna-Pick interpolation in several variables. *Integral Equations Operator Theory* 92 (2020).
3. Partially isometric Toeplitz operators on the polydisc. *Bu... Math. Soc.* 54 (2022),.

Dhriti Sundar Patra

Assistant Professor, Department of Mathematics

Office Room No.: C-308(C), Email: dhriti@math.iith.ac.in

Major Areas of Research/Up to 3 major sponsored projects

- Differential Geometry
- Riemannian Geometry
- Ricci Solitonts, Quasi-Einstein structure, Critical point equation, Fischer-Marsden conjecture

Major Research Facilities in the Group

- Solving some open problems in collaboration with some international geometers

Technology/Product Developed/Up to 3 most significant Publications

1. **Dhriti Sundar Patra** (2022): Some characterizations of ρ-Einstein solitons on Sasakian manifolds, Canadian Mathematical Bulletin, 65, 1036--1049. Cambridge University Press.

2. Shubham Dwivedi and **Dhriti Sundar Patra** (2022): Some results on almost *-Ricci-Bourguignon solitons, Journal of Geometry and Physics, 178, 104519. Elsevier

3. **Dhriti Sundar Patra** and Amalendu Ghosh (2021): On Einstein-type contact metric manifolds, Journal of Geometry and Physics, 169, 104342. Elsevier

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Jyotirmoy Rana

Assistant Professor, Department of Mathematics

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Major Areas of Research/Up to 3 major sponsored projects

- Bio-Fluid Mechanics
- Solute Dispersion and Oxygen Transport
- Quantum Mechanics
- Homotopy Analysis Method

Major Research Facilities in the Group

- Established computational facilities for research work
- A workstation for the computationally intensive component

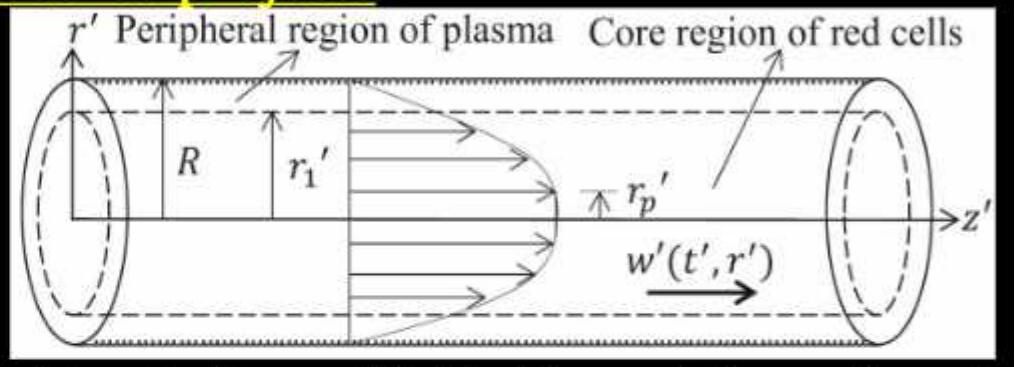

Fig: Schematic diagram of the blood flow model in a small vessel, r': radial direction, z': axial direction, R: radius of the vessel, r_1': radius of core region, r_p': radius of plug flow region, $w'(t',r')$: axial velocity of the blood in the vessel.

Technology/Product Developed/Up to 3 most significant Publications

1. Jyotirmoy Rana and P.V.S.N. Murthy (2016): Solute dispersion in pulsatile Casson fluid flow in a tube with wall absorption, *Journal of Fluid Mechanics* 793, 877–914, Cambridge University Press.

2. Jyotirmoy Rana and P.V.S.N. Murthy (2017): Unsteady Solute Dispersion in Small Blood Vessels using a Two-Phase Casson Model, *Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 473, 20170427, The Royal Society.

3. Prosanjit Das, Sarifuddin, Jyotirmoy Rana, and Prashanta Kumar Mandal (2022): Unsteady solute dispersion in the presence of reversible and irreversible reactions, *Proceedings of the Royal Society A* 478, 2264, 20220127. The Royal Society.

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Major Areas of Research/Up to 3 major sponsored projects

Fluid Mechanics, Convection in Porous Media, Hydrodynamic Stability

Major Research Facilities in the Group: Nil

Up to 3 most significant Publications

1. Gautam Kumar, **PAL Narayana**, KC Sahu.: Linear and nonlinear thermosolutal instabilities in an inclined porous layer. **Proc. Royal Soc. A** (2020) Vol. 476 Article ID: 20190705

2. Gautam Kumar & **PAL Narayana**.: On the stability of carbon sequestration in an anisotropic horizontal porous layer with a first-order chemical reaction. **Proc. Royal Soc. A** (2019) Vol. 475 Article ID: 20180365

3. JFL Duval, J Merlin, & **PAL Narayana**.: Electrostatic interactions between diffuse soft multi-layered (bio) particles: beyond Debye–Hückel approximation and Deryagin formulation. **Phy Chem Chem Phy** (2011) Vol.13, pp.1037-1053.

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Mrinmoy Datta

Assistant Professor, Department of Mathematics

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Webpage Link: https://sites.google.com/math.iith.ac.in/mrinmoy?pli=1

Major Areas of Research/Up to 3 major sponsored projects

- Algebraic geometry, Linear Error-correcting codes, Combinatorics
- (Sponsored Project) SERB Start Up Research Grant

Major Research Facilities in the Group

MAGMA, (a software for mathematical computations).

Technology/Product Developed/Up to 3 most significant Publications

1. 1. P. Beelen, M. Datta, and M. Homma, A proof of Sørensen's conjecture on Hermitian surfaces. *Proc. Amer. Math. Soc.* 149 (2021), no. 4, 1431–1441.
2. 2. P. Beelen, and M. Datta, Generalized Hamming weights of affine Cartesian codes. *Finite Fields Appl.* 51 (2018), 130–145.
3. 3. M. Datta, and S. Ghorpade, Number of solutions of systems of homogeneous polynomial equations over finite fields. *Proc. Amer. Math. Soc.* 145 (2017), no. 2, 525–541.

भारतीय सांकेतिक विज्ञान संस्थ हैदराबाद
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Indian Institute of Technology Hyderabad

Neeraj Kumar

Assistant Professor, Department of Mathematics

Office Room No. C531; Office Phone No. (040)2301 6613; neeraj@math.iith.ac.in; Webpage Link

Major Areas of Research/Up to 3 major sponsored projects

Commutative Algebra, Combinatorial Commutative Algebra

MATRICS Grant from SERB - Koszul Algebras and Diagonal Subalgebras

Proceedings of the American Mathematical Society

Published by the American Mathematical Society, the *Proceedings of the American Mathematical Society (PROC)* is devoted to research articles of the highest quality in all areas of pure and applied mathematics.

ISSN 1088-6826 (online) ISSN 0002-9939 (print)

The 2020 MCQ for Proceedings of the American Mathematical Society is 0.83 .

Current volume Articles in press

Recently published All issues : 1950 – Present

Diagonal subalgebras of residual intersections

HTML articles powered by AMS MathViewer

by H. Ananthnarayan, Neeraj Kumar and Vivek Mukundan PDF

Proc. Amer. Math. Soc. 148 (2020), 41-52 Request permission

Major Research Facilities in the Group

Research is theoretical in nature

Technology/Product Developed/Up to 3 most significant Publications

Diagonal subalgebras of residual intersection (with H. Ananthnarayan and Vivek Mukundan, Proc. Amer. Math. Soc. 148 (2020), 41-52.

Koszul property of diagonal subalgebras, J. Commut. Algebra, 6 (2014), 385-406.

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
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Indian Institute of Technology Hyderabad

Pradipto Banerjee

Associate Professor, Department of Mathematics

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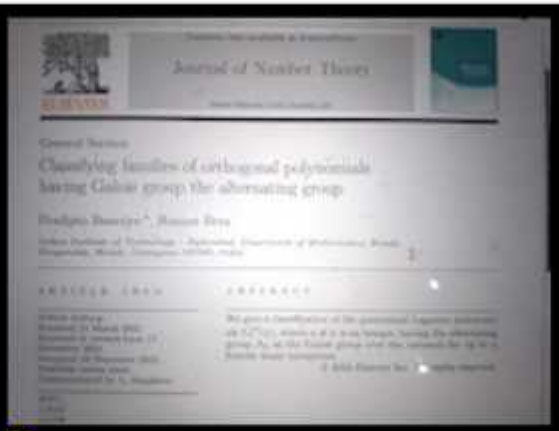
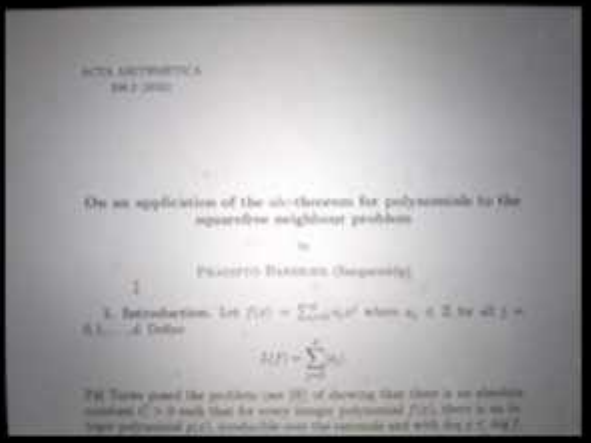
Two Individual

Major Areas of Research





Major Research Facilities in the Group

Technology/Product Developed

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M. Rajesh Kannan

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Major Areas of Research:

Spectral Graph Theory, Matrix Theory and Combinatorics.

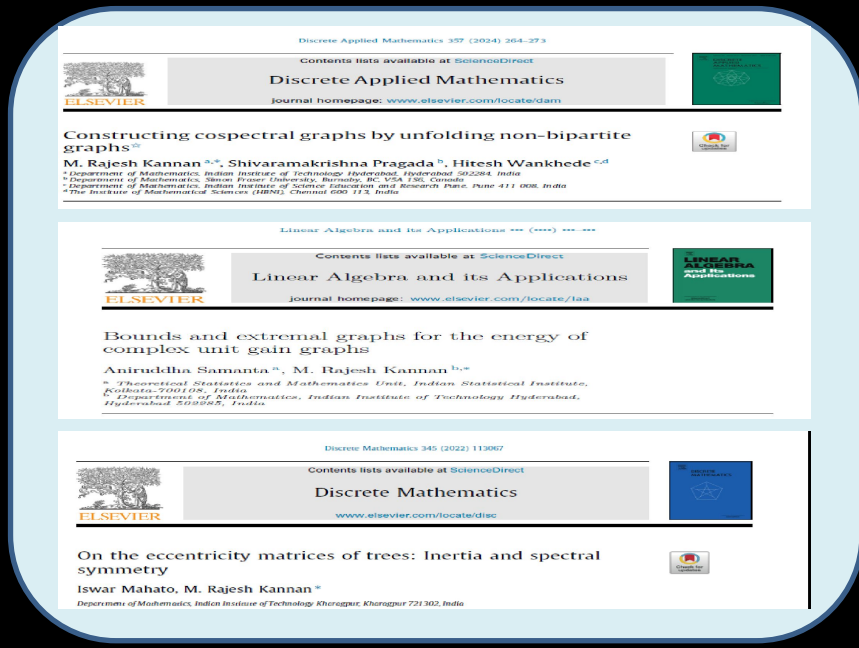
Major sponsored projects:

Core Research Grant (SERB-DST)

Mathematical Research Impact-Centric Support (SERB-DST)

Early Career Research (ECR) Award (SERB-DST)

International Travel Grant (SERB-DST)



Recent Publications

M. Rajesh Kannan, Shivaramakrishna Pragada and Hitesh Wankhede, Constructing cospectral graphs by unfolding non-bipartite graphs, Discrete Applied Mathematics, Volume 357 (2024) 264-273.

Aniruddha Samanta and M. Rajesh Kannan, Bounds and extremal graphs for the energy of complex unit gain graphs, Linear Algebra and its Applications (2024).

M. Rajesh Kannan and Shivaramakrishna Pragada, Signed spectral Turan type theorems, Linear Algebra and its Applications, 663(2023), 62-79.

Iswar Mahato and M. Rajesh Kannan, On the eccentricity matrices of trees: Inertia and spectral symmetry, Discrete Mathematics, Volume 345, Issue 11, November 2022, 113067.

Ramesh G

Professor, Department of Mathematics

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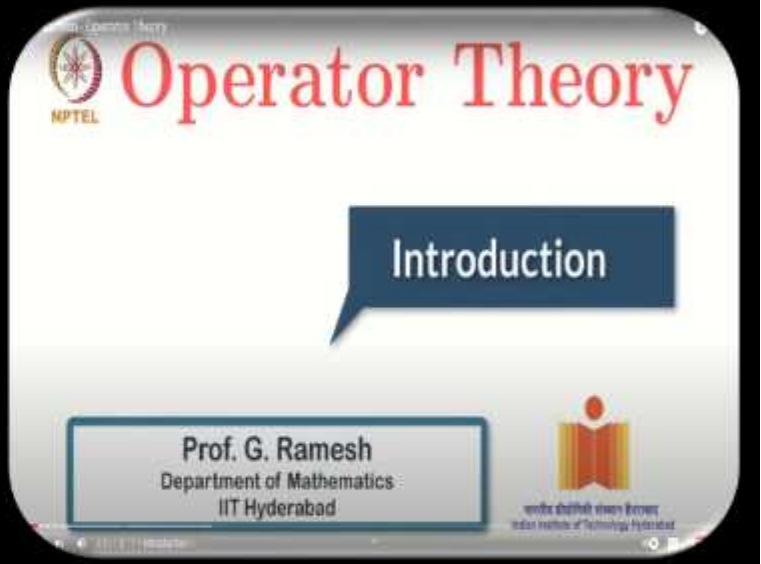
Major Areas of Research

Functional Analysis, Operator Theory

Major Research Facilities in the Group

Pure Mathematics

Technology/Product Developed



1. Ramesh, G.; Sequeira, Shanola S. Absolutely norm attaining Toeplitz and absolutely minimum attaining Hankel operators. *J. Math. Anal. Appl.* 516 (2022), no. 1, Paper No. 126497, 12 pp.
2. Bala, Neeru; Ramesh, G. A representation of hyponormal absolutely norm attaining operators. *Bull. Sci. Math.* 171 (2021), Paper No. 103020, 15 pp.
3. Ramesh, G., Sudip Ranjan, B., Venku Naidu, D.: A Representation of compact CC-normal operators. Linear Multilinear Algebra(2022). https://doi.org/10.1080/03081087.2022.2065234

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Sameen Naqvi

Assistant Professor GR1, Department of Mathematics

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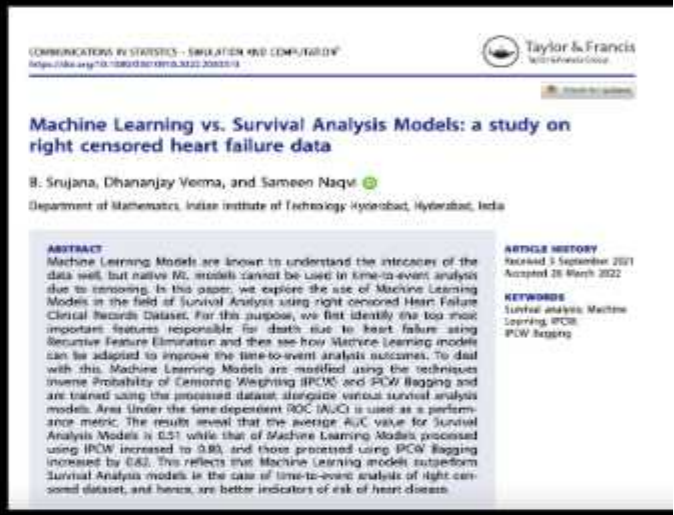
Major Areas of Research/Up to 3 major sponsored projects

Reliability Theory
Applied Statistics
Stochastic orders

Major Research Facilities in the Group

Statistical Reliability Virtual Lab
- Published a research paper with two of my lab students: Srujana (BTech MnC) and Dhananjay (MSc MnC).



COMMUNICATIONS IN STATISTICS - SIMULATION AND COMPUTATION

Taylor & Francis

Machine Learning vs. Survival Analysis Models: a study on right censored heart failure data

B. Srujana, Dhananjay Verma, and Sameen Naqvi

Department of Mathematics, Indian Institute of Technology Hyderabad, Hyderabad, India

ABSTRACT

Machine Learning Models are known to understand the intricacies of the data well, but native ML models cannot be used in time-to-event analysis due to censoring. In this paper, we explore the use of Machine Learning Models in the field of Survival Analysis using right censored Heart Failure Clinical Records Dataset. For this purpose, we first identify the top most important features responsible for death due to heart failure using Recursive Feature Elimination and then see how Machine Learning models can be adapted to improve the time-to-event analysis outcomes. To deal with this, Machine Learning Models are modified using the techniques Inverse Probability of Censoring Weighting (IPCW) and IPCW Bagging and are trained using the processed dataset. Alongside various survival analysis models, Area Under the time-dependent ROC (AUC) is used as a performance metric. The results reveal that the average AUC value for Survival Analysis Models is 0.51 while that of Machine Learning Models processed using IPCW increased to 0.80, and those processed using IPCW Bagging increased by 0.82. This reflects that Machine Learning models outperform Survival Analysis models in the case of time-to-event analysis of right censored dataset, and hence, are better indicators of risk of heart disease.

ARTICLE HISTORY
Received 3 September 2021
Accepted 28 March 2022

KEYWORDS
Survival analysis; Machine Learning; IPCW; IPCW Bagging

Technology/Product Developed/Up to 3 most significant Publications

1. Naqvi, S., Ding, W. and Zhao, P. (2021). Stochastic comparison of parallel systems with Pareto components. Probability in the Engineering and Informational Sciences, 1-13.
2. Srujana, B, Dhananjay, V. and Naqvi, S. (2022) Machine Learning vs Survival Analysis Models: a study on right censored heart failure data. Communications in Statistics-Simulation and Computation, 1-18.
3. Teega, V. and Naqvi, S. (2023). Preservation of mean inactivity time ordering for coherent systems with independent and dependent components. Submitted after first revision in Journal of Applied Probability.

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Sayantee Jana

Assistant Professor G-I, Department of Mathematics

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Major Areas of Research/Up to 3 major sponsored projects

1. Spatio-temporal modelling (was funded by Fields)
2. Multivariate skewed distributions (funded by SICI)
3. Generalized MANOVA model (funded by SICI)
4. Adaptive designs (applying for funding)
5. Data Mining (funded consultancy)

Major Research Facilities in the Group

128 Gb DDR5 i9 12 core CPU

2. will purchase two more CPUs of 64gb i9

Technology/Product Developed/Up to 3 most significant Publications

Mukherjee, A., Coad, D.S., & Jana, S.* Covariate-Adjusted Response-Adaptive Designs for Censored Survival Responses. Under Review in *Journal of Statistical Planning and Inference.*

Jana S., Balakrishnan N. and Hamid J. (2018). "Estimation of the parameters of the Extended Growth Curve Model under Multivariate Skew Normal distribution". *Journal of Multivariate Analysis, 166,* 111-128.

C S Sastry

Professor, Department of Mathematics

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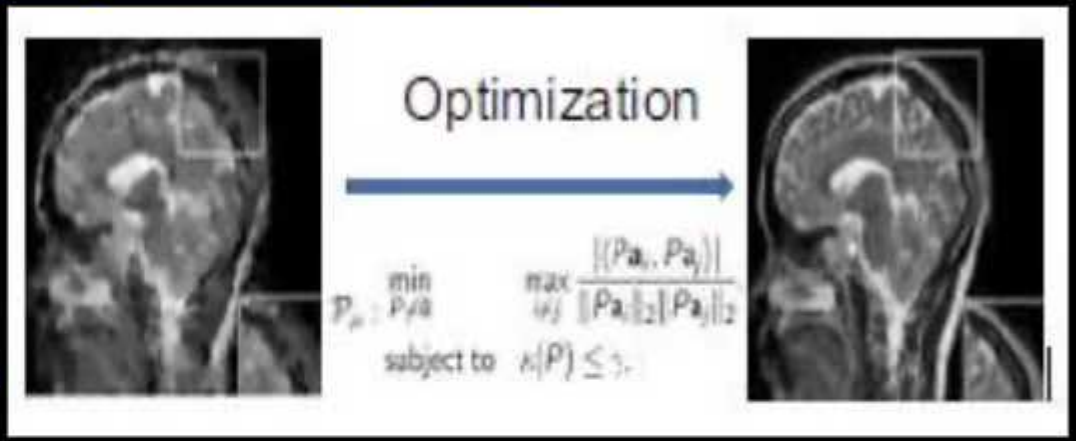
Major Areas of Research/Up to 3 major sponsored projects:

Wavelets

Sparse-Optimization Theory

Inverse Problems



Major Research Facilities in the Group

Advanced computing system

Most significant Publications

"Deterministic Compressed Sensing matrices: Construction via Euler squares and applications," *IEEE Tran. on Signal Processing*, Vol. 64, 3566-3575, 2016, (with R. R. Naidu, P.V. Jampana)

"Construction of highly redundant incoherent unit norm tight frames as a union of orthonormal bases," *Journal of Complexity*, Vol. 54, 2019 (with P. Sasmal and P. Jampana).

"Analysis of general weights in weighted l1-2- minimization through applications," Digital Signal Processing, 2023 (with K. Z. Najiya)

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भारतीय प्रौद्योगिकी संस्थान हैदराबाद
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D Sukumar

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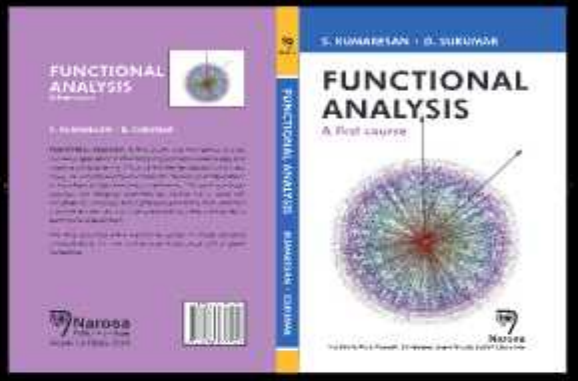
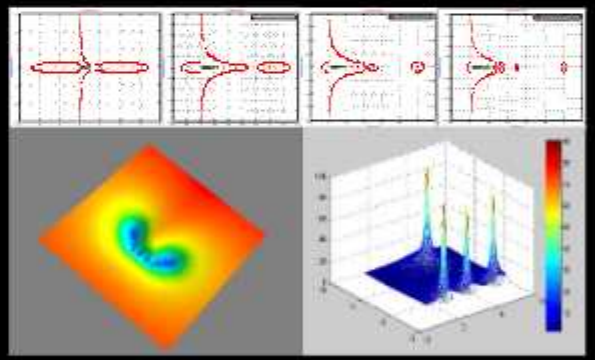
Functional Analyis, Banach algebra, Numerical Linear Algebra

Multiplicative functions and almost multiplicative functions in the context of generalized spectrum.



Major Research Facilities in the Group

Strong and committed group that encourages discussion and exploration.



Technology/Product Developed

Computing the pseudo-spectra and condition-spectra using the existing mathtools as well as open tools for various possible areas.

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Indian Institute of Technology Hyderabad

Tanmoy Paul

Associate Professor, Department of Mathematics

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Major Areas of Research

Functional Analysis, Analysis on Banach spaces

Projects completed:

1. DST Fast Track Young Scientist Project
2. SERB project Matrics

Candidates will gain skills to analyze research problems in a systematic manner through its geometrical viewpoints

3 most significant Publications:

(a) S. Daptari, T. Paul, Uniqueness of Hahn-Banach extension and some of its variants, Advances in Operator Theory 7 (3), 1-19 (2022)

(b) CR Jayanarayanan, T. Paul, Strong Proximinality and intersection properties of balls, J. Math. Anal. Appl., 426, 1217-1231 (2015)

(c) T. Paul, Various notions of best approximation properties in spaces of Bochner integrable functions, Advances of Operator Theory 2, 59-77(2017)

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Associate Professor,
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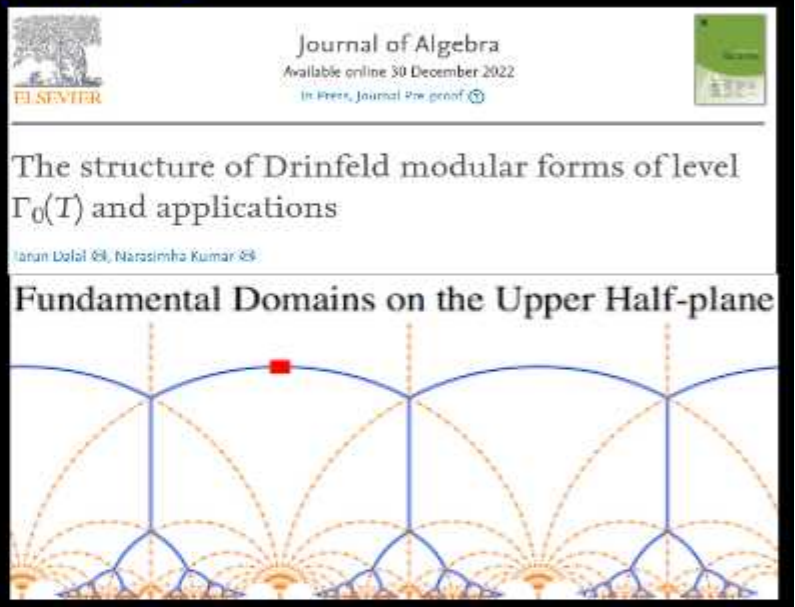
Major Areas of Research/Up to 3 major sponsored projects

Arithmetic Geometry, Number Theory

Major Research Facilities in the Group

Technology/Product Developed/Up to 3 most significant Publications



- The structure of Drinfeld modular forms of level $\Gamma_0(T)$ and applications (joint with Tarun Dalal). To appear in the Journal of Algebra
- On generation of the coefficient field of a primitive Hilbert modular form by a single Fourier coefficient (joint with Satyabrat Sahoo). To appear in the Canadian Mathematical Bulletin.
- Ribet's conjecture for Eisenstein maximal ideals of cube-free level (joint with Debargha Banerjee, Dipramit Mazumdar).

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D. Venku Naidu

Associate Professor, Department of Mathematics

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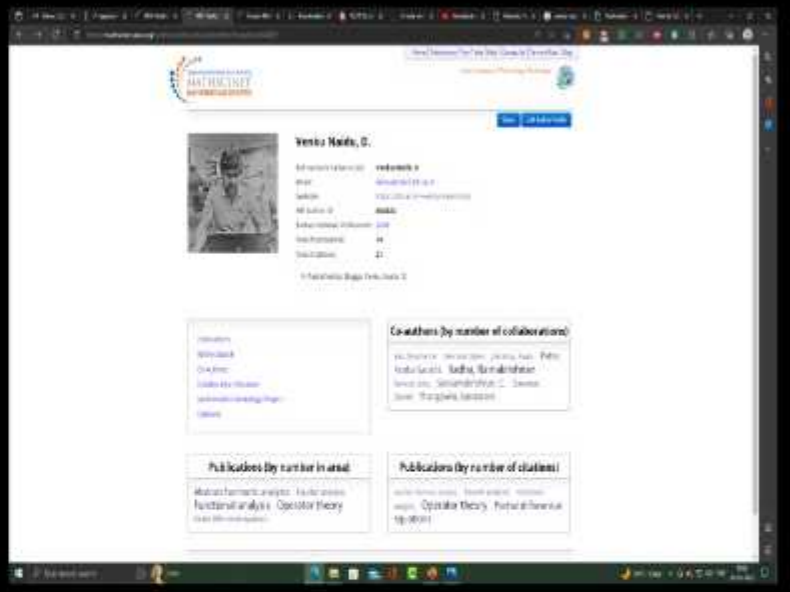
Major Areas of Research

Functional Analysis, Harmonic Analysis

Major Research Facilities in the Group

Pure Mathematics



Technology/Product Developed

1. Bais, Shubham R.; Venku Naidu, D. Study of twisted Bargmann transform via Bargmann transform. *Forum Math.* 33 (2021), no. 6, 1659–1670.

2. Sarathi Patra, Partha; Dogga, Venku Naidu Hardy's theorem and rotation for Dunkl transform. *Complex Var. Elliptic Equ.* 66 (2021), no. 1, 71–83.

3. Ramesh, G., Sudip Ranjan, B., Venku Naidu, D.: **Cartesian decomposition of C-normal operators**. Linear Multilinear Algebra(2022). https://doi.org/10.1080/03081087.2021.1967847

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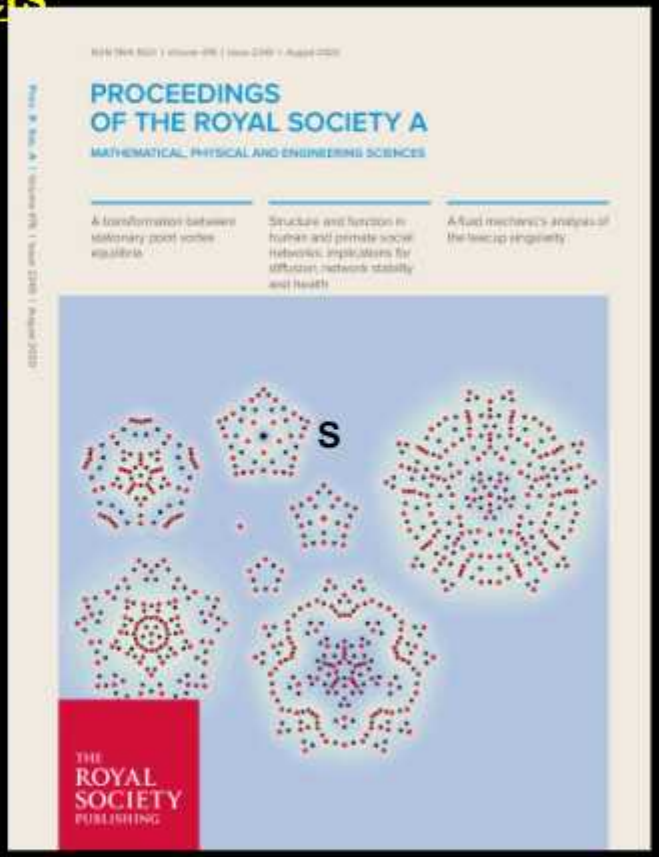
Major Areas of Research/Up to 3 major sponsored projects

Vortex dynamics, applied mathematics, fluid dynamics, applied complex analysis



Technology/Product Developed/Up to 3 most significant Publications

- Krishnamurthy, V., Wheeler, M., Crowdy, D., & Constantin, A. (2021). Liouville chains: New hybrid vortex equilibria of the two-dimensional Euler equation. Journal of Fluid Mechanics, 921, A1. doi:10.1017/jfm.2021.285
- Krishnamurthy VS, Wheeler MH, Crowdy DG, Constantin A. (2020). A transformation between stationary point vortex equilibria. Proc. R. Soc. A 476: 20200310. http://dx.doi.org/10.1098/rspa.2020.0310
- D. G. Crowdy and V. S. Krishnamurthy. Speed of a von Kármán point vortex street in a weakly compressible fluid. Phys. Rev. Fluids, 2(11):114701, 2017. http://dx.doi.org/10.1103/PhysRevFluids.2.114701

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