

## **Professor.Dr. S.Sundar**

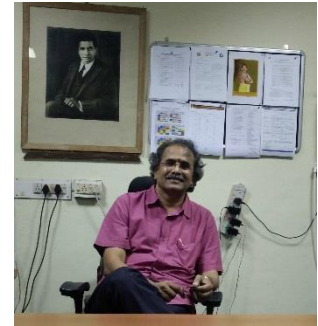
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- **Head, Department of Mathematics, IIT Madras.**
- **DAAD (German Academic Exchange Service) Research Ambassador.**
- **Associate Editor, International Journal of Advances in Engineering Sciences and Applied Mathematics, Springer.**
- **Member of SERB, DST-Program Advisory Committee (Mathematical Sciences).**
- **Editorial Board Member, Journal Indian Academy of Mathematics.**
- **Alumni Ambassador of the City Kaiserslautern & Distinguished Alumni of TU Kaiserslautern, Germany.**
  
- **Chairman, JEE(Advanced), IIT Madras – 2015.**
- **Vice Chairman, JEE (Advanced), IIT Madras – 2014.**
- **Chairman, HSEE, IIT Madras – 2014.**

### **Areas of Research:**

- Numerics for PDEs
- Mathematical Modeling & Numerical Simulation.

### **Career:**

**2013 -:** Professor (HAG Scale), Department of Mathematics, IIT Madras.

**2006 – 2013:** Professor, Department of Mathematics, IIT Madras.

**2000 – 2006:** Associate Professor, Department of Mathematics, IIT Madras.

**1999 – 2000:** Associate Professor, Department of Mathematics, IIT Kharagpur.

**1994 – 1999:** Assistant Professor, Department of Mathematics, IIT Kharagpur.

**1991 – 1994:** Post-Doctoral Fellow, Department of Mathematics, IISc Bangalore.

**1989 – 1991:** DAAD Post-Doctoral Fellow, AGTM, TU Kaiserslautern, Germany.

### **Education:**

**1989** Ph.D.(Mathematics), IIT Madras.

**1984** M.Sc.(Applied Mathematics), Anna University.

**1982** B.Sc.(Mathematics), University of Madras.

## **Publications:**

### **2018:**

1. Bifurcation and multiplicity results for a class of  $n \times n$   $p$ -Laplacian Systems. Communications on Pure and Applied Analysis, Vol.17, pp.1295 – 1304, 2018 (with Mohan Mallick, R.Shivaji and B.Son).
2. Infinite semipositone problems with a falling zero and non-linear boundary conditions, Differential and Integral Equations, Accepted (with Mohan Mallick, L. Sankar and R.Shivaji).
3. Discriminating between scaled and fractional motion via  $p$ -variation statistics, International Journal of Advances in Engineering Sciences and Applied Mathematics, Springer, DOI: 10.1007/s12572-018-0206-0 (with Agnieszka Wylomanska, Aleksandra Grzesiek and Janusz Gajda).

### **2017:**

4. A Finite Pointset Method for biharmonic equation based on mixed formulation, International Journal of Computational Methods, Accepted (with Jones Doss and N.Kousalya).
5. Fractional Brownian motion time-changed by gamma and inverse gamma process. Physica A. Vol.468, pp.648 – 667, 2017 (with A. Kumar, A. Wylomanska, R. Połoczanski).

### **2016:**

6. On a generalized  $5 \times 5$  stencil scheme for nonlinear diffusion filtering. International Journal of Advances in Engineering Sciences and Applied Mathematics. Springer. Vol.8 (3), pp.194 – 206, 2016 (with J.Mahipal and S.K.Sharma).

### **2015:**

7. A Comparative Study on MMDBM Classifier Incorporating Various Sorting Procedure. Indian Journal of Science and Technology. Vol 8(9), pp.868–874, 2015 (with P.Ganesan and S.Sivakumar).
8. An Experimental Analysis of Classification Mining Algorithm For Coronary Artery Disease. International Journal of Applied Engineering Research. Vol.10, pp. 14467-14477, 2015 (with P.Ganesan and S.Sivakumar).
9. A MMDBM Classifier with CPU and CUDA GPU computing in various sorting procedures. International Arab Journal of Information Technology. Accepted 2015 (with P.Ganesan and S.Sivakumar).

### **2014:**

10. Nonlinear conservation law model for production network considering yield loss. Journal of Non-linear Science and Applications. Vol.7, pp.205-217, 2014 (with Tanmay Sarkar).
11. On existence and stability analysis of a nonlinear conservation law model appearing in production system. Nonlinear Studies. Vol.21, pp.305-312, 2014 (with Tanmay Sarkar).

12. Computation of transmission coefficients in the plain and corrugated electro-magnetic wave guides using finite pointset method. *Applied Mathematical Modeling*. Vol.38, pp.1838-1845, 2014 (with SudhakarMatle).

**2013:**

13. GPU metrics for a linear solver. *Neural, Parallel and Scientific Computations*. Vol.21, pp.361-374, 2013. (with M.Panchatcharam and Axel Klar).
14. GPU computing for meshfree particle method. *International Journal of Numerical Analysis and Modeling, Series B*. Vol.4, pp.394-412, 2013. (with M.Panchatcharam, V.Vetrivel, Axel Klar and S.Tiwari).
15. Enforcing the discrete maximum principle for finite-difference solutions of coherence enhancing diffusion. *Journal of Indian Academy of Mathematics*. Vol.35, pp.209-215, 2013. (with J.Mahipal).
16. Conservation model of serial supply chain network incorporating various velocity forms. Vol.26, pp.363-377, 2013. *International Journal of Applied Mathematics*. 2013. (with TanmaySarkar).
17. A numerical study of Hierarchical matrix (H-matrix) for finite pointset method on solving a Poisson problem. *International Journal of Applied Mathematics*. Vol.26, pp.103-122, 2013. (with G.Satyanarayana).

**2012:**

18. Finite pointset method for 2D dam-break problem with GPU acceleration. *International Journal of Applied Mathematics*. Vol. 25, pp.547-557, 2012. (with M.Panchatcharam).
19. Axi-symmetric 2D simulation and numerical heat transfer characteristics for calibrating furnace in a rectangular enclosure. *Applied Mathematical Modeling*. Vol.36, pp.878-893, 2012. (with SudhakarMatle).

**2011:**

20. Total variation stability bounds on second order schemes for discontinuous flow problems. *Proceedings of the International Conference on Advances in Modeling, Optimization and Control*. IIT Roorkee, 2011. (with Ritesh Kumar Dubey and Nikhil Srivastava).
21. A 2D numerical study on aspect ratio of the enclosure and aperture heat losses for the high temperature spherical furnace through FEM. *International Journal of Applied Mathematics*. Vol.24, pp.267-288, 2011. (with SudhakarMatle).

22. On parallelization and load balancing aspects of finite pointset method. *International Journal of Computer Mathematics*. Vol.88, pp.360-374, 2011. (with A.B.Subrahmanyam, J. Kuhnert, S.Tiwari, Amol Joshi and Anshul Saxena).

**2010:**

23. Modeling and numerical simulation of free surface flows. *The Mathematics Student*. Vol.78, pp.127-144, 2010. (with LemiGuta).
24. Navier-Stokes-Brinkman system for interaction of viscous waves with a submerged porous structure. *Tamkang Journal of Mathematics*. Vol.41, pp. 217-243, 2010. (with LemiGuta).
25. Recursive formulation of the matrix Padé approximation in packed storage. *International Journal of Computers and Mathematics with Applications*. Vol.59, pp.1532—1540, 2010. (with M. Kaliyappan and S.Ponnusamy).

**2009:**

26. Asymptotic analysis of extrapolation boundary conditions for Lattice Boltzmann Methods. *International Journal of Computers and Mathematics with Applications*. Vol.57, pp.1313 - 1323, 2009. (with Maddu Shankar).
27. Optimal die shape for film casting. *Applied Mathematics Letters*. Vol.22, pp.1598-1603, 2009. (with K.Selvanayagam, Thomas Goetz and V.Vetrivel).
28. Formulation of Matrix Pade Approximation in Rectangular Full Packed Storage. *Journal of Mathematics Research*. Vol.1, pp.184-192, 2009. (with M. Kaliyappan and S.Ponnusamy).
29. Optimal control of film casting processes. *Int. J. Numerical Methods in Fluids*. Vol.59, pp.1111-1124, 2009. (with K.Selvanayagam, Thomas Goetz and V.Vetrivel).

**2008:**

30. Numerical simulation of free convection in isotropic porous medium. *Proceedings of the ISHMT-ASME 2008*. (with K.Venkataraman and Jaya Krishna).

**2007:**

31. Study of heat flow through highly porous heat insulators. *Studies in Applied Mathematics*, 118, pp.1-15, 2007. (with Samir Roy).

**2006:**

32. Understanding the porosity dependence of heat flux through glass fibre insulation. *Mathematical and Computer Modeling*. Vol.43, pp.485-492, 2006. (with Samir Roy and Michael Junk).

33. A new predictive classifier for improved performance in data mining: object oriented design and implementation. Proceedings of the International Conference on Industrial Mathematics, IIT Bombay. Narosa, pp.491-514, 2006. (with D. Srikanth and M.S. Shanmugam).

**2005:**

34. A recursive packed algorithm for Cholesky factorization of tridiagonal and pentadiagonal matrix. Journal of Indian Academy of Mathematics. Vol.27, pp.193-200, 2005.
35. A numerical case study on non-linear methods induced by linear Krylov solvers. Journal of Indian Academy of Mathematics. Vol.27, pp.431-438, 2005.
36. Parallel BiCGSTAB with latency hiding. Proceedings of the International Workshop on Modeling and Simulation, IIT Madras. Narosa, pp.328-335, 2005. (with A. Bhaskar Subramanyam).
37. Navier Stokes-Brinkmann model for incompressible flow over a porous layer. Proceedings of the International Workshop on Modeling and Simulation, IIT Madras. Narosa, pp.283-293, Narosa, 2005. (with S. Mohan Kumar and V. Vetrivel).

**2004 down:**

38. Grid free method for Poisson equation. Proceedings of the International Conference on Wavelet Analysis and Applications, RIASM. New Age International, pp.151-166, 2004. (with S. Tiwari and J. Kuhnert).
39. Lattice Boltzmann method for complex geometries. Proceedings of the International Conference on Combinatorial and Computational Mathematics, IIT Kharagpur. Narosa, pp.207-220, 2004. (with A.K. Singh, Axel Klar, M.K. Banda).
40. Pattern search in a shoe sole image database using eigenpatterns. Mathematical and Computer Modeling. Vol.37, pp.1281-1286, 2003. (with R. Rajendran and R.A. Panicker).
41. Newton-preconditioned Krylov subspace solvers for system of nonlinear equations: A numerical experiment. Applied Mathematics Letters. Vol.14, pp.195-200, 2001. (with B.K. Bhagavan and S. Prasad).
42. Testbed realization of Poisson characteristics in ATM QoS mechanism. Proceedings of the International Conference on Broadband Networking in New Millennium. Tata-McGraw Hill, pp.165-169, 2001. (with P. Mueller, B. Reuther and O.P. Vyas).
43. Generalized eigenvalue problems: Lanczos algorithm with a recursive partitioning method. Computers and Mathematics with Applications. Vol.39, pp.211-224, 2000. (with B.K. Bhagavan).

44. Comparison of Krylov subspace methods with preconditioning techniques for solving boundary value problems. *Computers and Mathematics with Applications*. Vol.38, pp.197-206, 1999.(with B.K.Bhagavan).
45. Computing eigenvalues: Lanczos algorithm with a new recursive partitioning method. *Computers and Mathematics with Applications*. Vol.38, pp.107-117, 1999. (with B.K.Bhagavan).
46. Comparison of Lanczos and CGS solvers for solving numerical heat transfer problems. *Computers and Mathematics with Applications*. Vol.37, pp.107-117, 1999. (with B.K.Bhagavan and K.S.Sastri).
47. VBR mechanism in ATM: An experimental investigation. *Proceedings of the International Conference on Recent Trends in Computer Modeling, Simulation and Communication*. Tata McGraw Hill, pp.226-232, 1999.(with O.P.Vyas, B.Reuther and P.Mueller).
48. Mode locking for an externally excited droplet. *Computers and Mathematics with Applications*. Vol.33, pp.21-33, 1997.(with R.Ravindran).
49. A robust root finding algorithm using recursive partitioning method. *Proceedings of the 7<sup>th</sup> National Seminar on Theoretical Computer Science*. Tata McGraw-Hill, pp.90-93, 1999.(with M.Mukherjee and K.G.Krishnakumar).
50. A simple mathematical model for infectious disease. *The Nepali Mathematical Sciences Report*. Vol.15, pp.107-122, 1996.(with S.Tiwari and Michael Hack).
51. Two shock interaction with new theory of shock dynamics. *Computers and Mathematics with Applications*. Vol.28, pp.37-47, 1994.(with R.Ravindran).
52. Long time behaviour of the solution of a system of equations from new theory of shock dynamics. *Computers and Mathematics with Applications*. Vol.27, pp.91-104, 1994.(with R.Ravindran and P.Prasad).
53. A case study with the new theory of shock dynamics. *Applied Mathematics Letters*. Vol.5, pp.89-92, 1992.(with P.Prasad and R.Ravindran).

54. A two-dimensional Kaniel kinetic scheme for the isentropic compressible flow. *Berichte (Forschung) der Arbeitsgruppe Technomathematik, TU-Kaiserslautern*, Vol.60, pp.1-52, 1991. (with M.Baecker, H.Neunzert and Suhail Younis).
55. Computational models and matrix Pade approximants. *Proceedings of the International Conference on Mathematical Modeling in Science and Technology. Tata-McGraw Hill*, vol.2, pp.18-25, 1990. (with P.Achuthan).
56. A recursive algorithm for matrix Pade approximants: the divide and conquer approach. *Computers and Mathematics with Applications*. Vol.17, pp.1359-1367, 1989. (with P.Achuthan).
57. Ramanujan functions, continued fractions and rational approximations. *Journal of Mathematics and Physical Sciences*. Vol.23, pp.481-491, 1989. (with P.Achuthan).
58. A new application of extended Euclidean algorithm for matrix Pade approximation. *Computers and Mathematics with Applications*. Vol.16, pp.287-296, 1988. (with P.Achuthan).
59. On certain special functions, continued fractions and Pade approximations. *Proceedings of the National Symposium on Special Functions. Tata McGraw-Hill*, pp.50-63, 1987. (with P.Ponnusamy and P.Achuthan).

**Special Issues in Journals as Guest Editor/ Proceedings Publications as Editor:**

1. Special Issue on Modeling-Optimization-Simulation, Guest Editor, *International Journal of Advances in Engineering Sciences and Applied Mathematics*, Springer, March 2018 (with Thomas Goetz).
2. Special Issue on PDE Models and Computation. Part IV. Guest Editor. *International Journal of Advances in Engineering Sciences and Applied Mathematics*. Springer. December 2016.
3. Special Issue on PDE Models and Computation. Part III. Guest Editor. *International Journal of Advances in Engineering Sciences and Applied Mathematics*. Springer. September 2016.
4. Special Issue on PDE Models and Computation. Part II. Guest Editor. *International Journal of Advances in Engineering Sciences and Applied Mathematics*. Springer. September 2015.
5. Special Issue on PDE Models and Computation. Guest Editor. *International Journal of Advances in Engineering Sciences and Applied Mathematics*. Springer. June 2015.
6. "Advances in PDE Modeling and Computation", *Proceedings of the International Workshop on Advances in PDE Modeling and Computation*, Ane Press, 2013.



7. “Modeling and Simulation”, *Proceedings of the International Workshop on Modeling and Simulation in Life Science, Materials and Technology, Narosa, 2005* (with A.Avudainayagam and P.Misra).
8. “Modeling and Simulation in Industrial Problems: Ocean Engineering and Chemical Processes”, *Report on Technology Appreciation Program, IIT Madras, 2002* (with A.Avudainayagam).
9. “Recent Advances in Mathematical Sciences”, *Proceedings of the International Conference on Recent Advances in Mathematical Sciences, Volume 1 & 2, Narosa, 2000* (with S.B.Sinha and J.C.Misra).
10. *Proceedings of the International Conference on Mathematical Modeling of Nonlinear Systems, IIT Kharagpur, 1999* (with J.C.Misra).

## Ph.D. Students:

### **Current:**

1. **Mohan Mallick**, On the Existence, Bifurcation and Multiplicity of Elliptic Systems with combined Non-linear effects.
2. **Nithyananda Roy**, Numerics for Population Balance Equation.
3. **PrasanthaGiri**, Time Series and PDE Modeling for Big Data.
4. **ParveenaShamim**, Pedestrian Traffic Flow and Crowd Dynamics Models.
5. **SomnathMaity**, Numerical Simulation and analysis of Pedestrian Traffic Flow Models using meshfree methods.
6. **A.Mageswari**, Crowd Dynamics Models.
7. **P.Rohini**, Non-linear Diffusion Filters for Medical Imaging.
8. **Jyoti**, Parallel GPU Analysis for Flow Simulations.
9. **Pradeep Kumar Mishra**, PDE models for Supply Chain Flow.

### **Completed:**

10. "A Computational Study on Non-linear Diffusion Filters", **Surendra Kumar Sharma, 2016** (Currently Faculty (contract) at NIT Calicut).
11. "A Study on Nonlinear Conservation Law Model of Production System Incorporating Yield Loss", **Tanmay Sarkar, 2015**. (Currently Assistant Professor at IIT Jammu).
12. "A Study on Rotation Invariance and Discrete Maximum Principle for Finite Difference Solutions of Nonlinear Diffusion Filtering, **J.Mahipal, 2014**. (Currently Assistant Professor, Mahindra EcoleCentrale, Hyderabad).
13. "GPU Accelerated Finite Pointset Method for Flow Problems", **M.Panchatcharam, 2013**.(Currently Assistant Professor at IIT Tirupati).
14. "A Numerical Heat Transfer Modeling Study on the Isothermal Spherical Cavity with Uniform Block Heating", **SudhakarMatle, 2011**.(Currently Assistant Professor, Centre for CFD at VIT University).
15. "Wave Porous Structure Interaction: Modeling, Analysis and Numerical Simulation", **LemiGuta, 2010**.(Currently Vice President, University of AdisAbaba, Ethiopia).
16. "Asymptotic Analysis and Applications of Boundary Conditions for Lattice Boltzmann Methods", **Maddu Shankar, 2009**. (Currently Senior Research Scientist, Genpact, Hyderabad).
17. "Optimal Control of Film Casting Processes" **K. Selvanayagam, 2008**. (Currently Senior Research Scientist, LMS-Siemens Technologies, Chennai).
18. "Modeling of Heat Flow Through Glass-Fibre Insulation", **Samir Roy, 2005**.(Currently Faculty at RKM.College, University of Calcutta, Kolkata).
19. "Modeling and Simulation of Incompressible Fluid Flow Through Porous Obstacles in a Open and Closed Channel", **S.Mohan Kumar, 2005**. (Currently Vice President, Research, BNY Mellon, Pune).
20. "Emperical Study of QoS and Congestion Control Mechanism in ATM Networks", **O.P.Vyas, 2000**.(Currently Professor of Software Engineering, IIIT Allahabad).

21. “Study on Krylov Subspace Methods for Numerical Heat Transfer and Eigenvalue Problems”, **B.KrishnaBhagavan, 1999**. (Currently CEO, Sansys Technologies, London).
22. “Predictive Modeling Based on Classification Method”, **V.Prashanth, 2000**. (M.S. by research). (Currently Senior Research Analyst, Wipro, Hyderabad).

**Post-Doctoral Fellows:**

1. **Dr.J.Ramana Reddy, Institute PDF, since January 2018.**
2. **Dr.Ritesh Kumar Dubey, Institute PDF, 2010 – 2012.**

## **M.Tech. (Industrial Mathematics& other) Projects:**

### **Current :**

1. Nikhil SasiRajan, jointly with Dow Agro.
2. P.Aravind, jointly with Dow Agro.
3. AbhikDebnath, jointly with Dow Agro.
4. Krishna Kumar, jointly with Tiger Analytics.
5. Sushant Kumar Seet, jointly with Tiger Analytics.
6. Rohit Malik, Time Series and PDE modeling on Big Data.
7. RohitKempari, jointly with Dow Agro.

### **2018:**

8. Sahil Gupta, "Computational Analysis of Application of H-Matrices on FPM based Systems", 2018.
9. N. Anjali, "Numerical Methods in Population Balance Equations", 2018.
10. Sonakshi Singh, "TV Program Asset Scheduling", 2018.
11. AtulTripathi, "The Quadrature Method and its Application to find the Bifurcation Branch of Second Order Autonomous Differential Equations", 2018.
12. DeepanshuKarnwal, "Technology Trends Identification", 2018.
13. Anil Kumar Nayak, "Marketing Mix Model (Media Mix Optimization)", 2018.
14. RahulSaha, "Identify Machine Failure with Machine Log Data", 2018.

### **2017:**

15. RimpaMondal (Fraunhofer ITWM, Germany), "Pore-scale Simulation Model and Verification", 2017.
16. Manish Arora (RWTH Aachen, Germany), "Solar Tower Heliostat Field Optimization", 2017.
17. MunishRajora (Tiger Analytics, Chennai), "TV Program Assets Scheduling", 2017.

### **2016:**

18. Kumar Saurabh (RWTH Aachen), "Analysis and Implementation of Asynchronous Finite Difference Scheme for Advection Diffusion Equation", 2016.
19. Pawan Kumar (RWTH Aachen), "Mathematical Models for Tumor Growth & Uncertainty Qualification for the Input Data Involved", 2016.
20. Poonam Panchal (DRDO), "Analysis of Algorithms for Inversion of Acoustic Impulse Response Data to Estimate Water Column Sound Speed Profile in Shallow Water", 2016.
21. Harish Lingam, "Curve Fitting Problem of Two Dimensional Road", 2016.

22. Prashant Giri (Tiger Analytics), "Analysing Machine Log Data and Identify the Machine Failure", 2016.
23. Arvind Kumar Singh Gautam (Tiger Analytics), "Analysing Machine Log Data & Prediction of Machine Failure", 2016.
24. Sanjeet Kumar, "Development of a 2D Shallow Water Model for Simulating Flow through Rigid Vegetation", 2016.
25. Suraj Singh, "Quadratic Serendipity Finite Elements on Polygons Using Generalized Barycentric Coordinates", 2016.

**2015:**

26. Vinay Kumar, "Finite Pointset Method for Poisson Problem with GPU and multi-GPU acceleration", 2015.
27. Ashutosh Kumar, "Preconditioning Techniques for Large Sparse Linear System", 2015.
28. K. Balakumaran, "Reliability based Design Optimization of Pressure Vessel", 2015.
29. N. Nithyananda Rao, "Networks: Extreme Events and Complexity", 2015.
30. Soubhagini Mohapatra, "Data Mining Model: Prognosis of Diabetes Mellitus Using SPRINT – A Decision Tree Classifier", 2015.
31. Shailesh Kumar, "Data Mining: Classification of Data and Computation on GPUs", 2015.

**2014:**

32. Anuj Kumar Tiwari, "Linear Methods for Mie-Theory Inversion Problems", DAAD Sandwich M.Tech. Project, Centre for Computational Engineering, RWTH Aachen, Germany, 2014.
33. Nitin Kumar Yadav, "Illumination Optics: -Optimal transport for optical design", DAAD Sandwich M.Tech. Project, Centre for Computational Engineering, RWTH Aachen, Germany, 2014.
34. Subrahmanya Bharathi, "New Classification Mining Algorithms and GPU Computing", 2014.
35. B. Pradeep Kumar, "Hyperbolic Conservation Law models for Serial Supply Chain", 2014.
36. Debajyoti Ghosh, "A 2d Finite Volume Simulation of Wave-Porous Structure Interaction based on Navier-Stokes Brinkmann System", 2014.
37. Zulfikar Ahmad, "A Study on models for Wave-Structure Interaction", 2014.
38. Sudhir Kumar Chaudhary, "Modeling Nano-functional Materials", 2014.

**2013:**

39. "Predicting Failure of Industrial Machines using Association Rule Mining- A Case Study with Caterpillar Inc.", Vinay Prabhakar Katiyar, 2013.
40. "Fault Failure Analysis using Sequential Pattern Mining- A Case Study with Caterpillar Inc.", D. Shreshma, 2013.

41. "Simulation of 3D Plane and Corrugated Waveguides using FDTD Method", P.Soumya, 2013.
42. "Finite Difference Method for the Solution of some Elliptic Type Partial Differential Equations", Itendra Kumar, 2013.

**2012:**

43. "GPU Computing: Implementation and performance assessment of CUDA for some Flow Problems", Rajani Rai, TU Kaiserslautern, Germany, 2012.
44. "Product Link Analytics I – A Case Study with Caterpillar Inc.", M.Sivanesan, 2012.
45. "Product Link Analytics II – A Case Study with Caterpillar Inc.", Charan Sai K, 2012.
46. "Momentum Transfer in gas filled nano channels", Chandra Sekhar Nishad, 2012.
47. "Electroporetic partitioning in Two - Phase micro flows", Sham Bansal, 2012.
48. "Total Variation Stability Bounds for Second Order Scheme for Discontinuous Flow Problem", Nikhil Srivastava, 2012.

**2011:**

49. "Numerical Simulation of Microwave Passive Components", V.Sai Prasanth, 2011.
50. "H-Matrix  $R_k$  structure for FPM", Nageswar Rao, 2011.

**2010:**

51. "Mathematical Models and Radiative Transfer Equation (Clinical Radiotherapy)", Challa Durga Prasad, 2010.
52. "Hierarchical Matrix Analysis for Finite Point-Set Method", Mohammad Tamsir, 2010.

**2009:**

53. "Offline Handwritten Character Recognition For Tamil Language", Rajkumar, 2009.
54. "Speed up the computation of Jacobian using Graph Coloring", Krishna Pratab Singh, 2009.
55. "Hybridizing Euler and Boltzmann Equations using Particle Methods", Ragavendar, 2009.
56. "Computer Aided Steering Assistant for Backward Move of a Truck with a 2-Axle Trailer", Anamika Pandey, 2009.

**2008:**

57. "A mesh free approach for Electrodynamics", Vivek Pandey, 2008.
58. "Modeling and Simulation of ATM Traffic Congestion", Chaudari Parag Bhaskar, 2008.
59. "Topological Filter for Image Processing", Ravi Kumar, 2008.
60. "Free surface simulations of viscous Incompressible flows", Mohd Arif, 2008.
61. "Parallelization and Load Balancing of the Finite Pointset Method", Ajay Kumar, 2008.
62. "Hydraulics Model Parameter Estimation and Kalman Filter", Anshul Deep Saxena, 2008.

**2007:**

63. "Numerical simulation of free convection in an isotropic and anisotropic porous medium", Venkat Raman, 2007.
64. "Enhancement and Parallel computing of FPM: A meshless method", Joshi Amol Dilip, 2007.

**2006:**

65. "M-Matrix Analysis for Finite Pointset Method", Vikash Kumar Sharma, 2006.
66. "Object Oriented Finite Pointset Toolkit", Shankar Nayak Bhukya, 2006.

**2005:**

67. "E-RADAU5: A Sensitivity Analysis Tool for Differential Equations", Nageswara Rao, 2005.

**2004 down:**

68. "Computation of Traffic Flow Models Using Relaxation Schemes", V. S. Kamal HasanBehara, 2004.
69. "Issues in Parallelizing the Finite Pointset Method", A.B. Subramanyam, 2004.
70. "Lattice Boltzmann Method for Complex Geometries", Anita Kumari, 2003.
71. "A Study on Nutrine Finished Goods Inventory Problem and Inventory Optimization", K. Balaji Reddy, 2002.
72. "Mobile ATM Protocol Implementation and Performance Evaluation", Deepak Kumar Singh, 2000.
73. "Performance Comparison of Explicit Rate Calculation Switch Schemes for Available Bit Rate ATM Service", E. Koteswara Rao, 2000.
74. "An Interface Tool for Distributed Database Access", Utam Pattanayak, 2000.
75. "An Online Office Information Service-Implementation Under VB Platform", Mohini, 1999.
76. "Performance of ATM with EFCI on CIF over Ethernet", Henry A.K.A, 1999.
77. "Performance Comparison of Feedback Rate Based Flow Control Schemes for Available Bit Rate ATM Service", L. Bharath, 1999.
78. "A User Interactive Webpage Creation Using JAVA", Sukumar. T. K, 1998.
79. "A Neuro Fuzzy Decision Support System for Automated Vehicle Guidance", S. Rajesh, 1998.
80. "Mathmedia: A Multimedia Information System", G. Jagannathan, 1997.
81. "An Intelligent Decision Making System for Autonomous Vehicle Control", Sunil Kumar. U.K., 1997.
82. "Development of Network Traffic Analyzer", Suman, 1996.

**M.Sc. Projects:** Guided over 150 MSc Project students.

### **Sponsored Projects:**

1. "Modeling of microwave passive components for high power applications ", August 2007 –February 2012, National Fusion Program, Institute for Plasma Research, India.
2. "Knowledge Based Systems for Spatial Databases and Geographic Information Systems", Indian Space Research Organization (ISRO), March 2003-August 2006.
3. "Mathematical Modeling and Computer Graphics Simulations for the Analysis of DNA Topology", Ministry of Human Resource Development (MHRD), May 2000-April 2002.
4. "Transonic Aeroelastic Analysis of Launch Vehicle", Indian Space Research Organization (ISRO), June 1996-May 1999.
5. "Cost Effective Determination of Mechanical Parameters Using Mathematical Modeling and Image Processing", All India Council for Technical Education (AICTE), March 1996-February 1999.



## **Conferences/Workshops/GIAN course Organized:**

### **2018:**

1. GIAN 171003K06 course on “Advanced Mathematical Methods for Real Data Analysis: From PDE approach to Time Series Modeling”, March 5 – 10, 2018 (with Prof. Agnieszka Wylomanska, Wrocklaw University of Science and Technology, Poland).

### **2016:**

2. International Conference on Advances in Scientific Computing, November 28 – 30, 2016 to be held at IIT Madras.

### **2014:**

3. DAAD Supported International Conference on Mathematical Modeling and Computer Simulation, December 8-10, 2014, IIT Madras.

### **2013:**

4. International Workshop on Advances in PDE Modeling and Computation, October 21-25, 2013.
5. DST Sponsored NPDE-TCA PG Level Training Program on Differential Equations, Numerics and Modeling, May 20 – June 8, 2013.

### **2012:**

6. International Workshop on “Modeling, Computing and Optimization”, Sep.3-12, 2012.
7. NBHM ATM School on Differential Equations and Computing, June 2012.

### **2011:**

8. International Workshop on “Computational PDE Modeling and Simulation”, Jan 3-12, 2011.

### **2009/2008:**

9. International Workshop on “PDE: Models and Numerics”, December 7-16, 2009.
10. International Workshop cum lecture Series on “Computational Models and Methods Driven by Industrial Problems”, November 17, 2008 – February 27, 2009 (in 3 Phases).

### **2007:**

11. International Winter School on “Modeling, Computing and Simulation in Engineering”, December 11, 2006 – January 12, 2007.

### **2004 down:**

12. International Workshop on “Modeling and Simulation in Life Science, Materials and Technology”, December 2004.
13. Technology Appreciation Programme on “Modeling and Simulation in Engineering Problems”, December 2002.

**Reviewer Journals:**

- Springer Plus.
- AMS Mathematical Review.
- Proceedings of the National Academy of Sciences, A:Physical Sciences.
- Journal of Defense Modeling and Simulation.
- International Journal of Structural Changes in Solids.
- International Journal of Computational Fluid Dynamics.
- Computers and Fluids.
- Pattern Recognition Letters.
- International Journal of Geomathematics.
- Journal of Marine Science and Applications.
- Communications in Heat and Mass Transfer.
- Applied Mathematics and Computing.
- Bulletin of Calcutta Mathematical Society.
- Journal of Analysis.
- Applied Mathematics Letters.
- Computers and Mathematics with Applications.
- Mathematical and Computer Modeling.
- International Journal of Computational Methods.

## **Selective Invited Talks:**

**2018:**

Lecture Series on Mathematical Modeling	Lakshmikanthan Institute for Advanced Studies, Vizag	16/03/2018
Plenary Talk at the International Conference on Application of Mathematics	Hindustan University, Chennai	23/03/2018

**2017:**

Colloquium Talk	Osmania University, Hyderabad	26/08/2017
National Level Workshop for College Students	St. Annes College, Hyderabad	26/08/2017
One Day DAAD Research Workshop	Taj Hotel, Hyderabad	30/08/2017
Invited Talk at the International Conference on Mathematics of Data Science	K.L. University, Vijayawada	17/11/2017
Invited Talk at the International Conference on PDE and Applications	SRM University, Chennai	08/12/2017
Plenary Talk at the SIAM International Conference	VIT Vellore	01/12/2017
Lecture Series DST Sponsored Workshop	PSG Arts and Science College, Coimbatore	18/09/2017

**2016:**

'NationalScienceDay', IITMadras	Invited talk on "Mathematics–AKeyTechnology"	28.02.2016
NationalConferenceon 'PDEs,RamanujanInsitute', Chennai	Invited talk on "SolutionofGas KineticEquationsusingSQMOM"	02.03.2016
NationalConferenceon 'PhysicsOfFluidsandFluid Dynamics',JadavpurUniversity	Invited talk on "HeatTransferModelingofglassfiberinsulation"	03.03.2016
"PitchingrightIntelligentQuestions on EngineeringMathematics"	VIT, Vellore	09.01.2016
"MathematicalChallengesThroughIndustrialProblems"	NIT, Raipur	14.03.2016

**2015:**

- International Conference on Current Trends in PDEs: Theory and Computation, South Asian University, New Delhi, December 28-30, 2015.

- National Conference on Mathematics and Applications: Theme PDEs, DayanandSagar University, Bangalore University, 14<sup>th</sup> December 2015.
- Workshop at Computer Applications, NIT Trichy, 27<sup>th</sup> November 2015.
- National Workshop on Parabolic PDEs and Application to Image Processing, Sri Satya Sai Institute of Higher Learning, 28-29 October 2015.
- International Workshop on “Future of Mathematics”, Fraunhofer Institute for Industrial Mathematics, Kaiserslautern, Germany, 11-18 October 2015.
- Colloquium Talk, TIFR-CAM Bangalore, 6<sup>th</sup> October 2015.
- Invited Talk at DST Workshop, IIT Roorkee, 31<sup>st</sup> July 2015.
- Lecture Series, NPDE PG Training Program, IIT Madras, 1-4 June 2015.
- International Conference on Big Data Analysis, IIM Ahmedabad, 12<sup>th</sup> April 2015.
- Workshop on Mathematical Modeling and Computer Simulation, IIT BHU, 20-21 March, 2015.
- Prof.Lakshmikantham’s Birthday Remembrance Lecture, GSVP Vizag, 16<sup>th</sup> March 2015.
- National Conference on Advances in Applied Mathematics, University of Mysore, 20<sup>th</sup> February 2015.
- Colloquium Talk at SASTRA University, Tanjore, 14<sup>th</sup> February 2015.

**2014:**

- National Conference on Ramanujan’s Works and Current Trends in Computational Mathematics, Prof.V.Lakshmikantham Institute for Advanced Studies in Mathematics, Vizag, 22<sup>nd</sup> December 2014.
- Scientific Talent Enrichment Program of Kerala State, IISER Trivandram, 18<sup>th</sup> December 2014.
- One day Lecture Series on “GPU Scientific Computing” and LNMIIT, Jaipur, 9<sup>th</sup> August 2014.
- National Workshop on Advanced Computational Mathematics, NIT Jamshedpur, 26<sup>th</sup> June 2014.
- DST-NPDE PG Level Training Program Lecture Series, IIT Guwahati, 19-21 June, 2014.
- School of Advanced Sciences, Fluid Dynamics Division, VIT University, April 4, 2014.
- National Conference on Emerging Trends in Physics of Fluids and Solids, Jadavpur University, March 6, 2014.
- International Conference on Advances in Applied Mathematics, Bharathiar University, February 25, 2014.
- 1<sup>st</sup> International conference of Indian Society for Mathematical Modeling and Computer Simulation, January 2, 2014.

**2013:**

- International conference on Recent Advances in Mathematical Sciences and Applications, Prof.V.Lakshmikantham Institute for Advanced Studies in Mathematics, Vizag, Decemer 21, 2013.
- Workshop on Research Concepts in Computer Science using MATLAB”, Bharathidasan University, December 18, 2013.
- XVIII Ramanujan Symposium on Recent Trends in Dynamical Systems and Mathematical Modelling ,Ramanujan Institute for Advanced Studies in Mathematics, University of Madras, September 25, 2013.
- Workshop on PDE Analysis and Applications, Banaras Hindu University, July 27-28, 2013.
- Vaithiyanathaswamy Mathematics Trust One Day Colloquium, Ramanujan Institute for Advanced Study in Mathematics, March 22, 2013.
- Workshop on Recent Developments in Numerical Methods for Evolution Equations, IIT Bombay, March 19-20, 2013.

**2012:**

- Training Program on Numerical Methods for Fluid Dynamics, Indian Institute of Space Technology, Trivandrum, December 18, 2012.
- National Symposium on Mathematical Methods and Applications, IIT Madras, December 22, 2012.

**2011:**

- Refresher Course on Differential Equations, Ramanujan Institute for Advanced Studies in Mathematics, University of Madras, November 25-26, 2011.
- Indo-UK Symposium on Recent Advances in Industrial and Applied Mathematics, November 5-6, 2011, IIT Bombay, India.
- International Workshop on Population Balance Equation, September 27-30, 2011, Fraunhofer ITWM, Kaiserslautern, Germany.

**2010:**

- International Conference on Recent Advances in Fluid Mechanics, December 21-24, 2010, Osmania University, Hyderabad, India.
- International Workshop on Recent Advances in Mechanics, November 25-27, 2010, IIT Madras, India (in Honor of Prof.K.R.Rajagopal).
- International Workshop on “Kinetic Theory and Multiphase Phenomena”, August 27-30, 2010, University of Witwatersrand (held at Kruger Park), South Africa.
- ICM Satellite Conference on “Mathematical Applications in Science and Technology”, August 15-17, 2010, ISIAM New Delhi, India.
- DAAD Supported International Workshop on “Industrial Mathematics”, July 28-31, 2010, ITB Bandung, Indonesia.

**2009 down:**

- Indian Mathematical Society Annual Conference, December 27-30, 2009, Kalasalingam University, India.
- International Conference on “Recent Advances in Mathematical Sciences and Applications”, December 19-22, 2009, Lakshmikantham Institute of Mathematics, Vizag, India.
- International Conference on “Controls and Inverse Problems”, December 17-19, 2009, Indian Institute of Science, Bangalore, India.

**Teaching (Last Six Semesters):**

July – November 2018:

MA5710 Mathematical Modeling in Industry

MA5740 Object Oriented Programming

January – May 2018:

MA2040 Probability, Statistics and Stochastic Processes

July – November 2017:

MA5710 Mathematical Modeling in Industry

MA5740 Object Oriented Programming

January – May 2017:

MA5790 Computer Modeling and Simulation

MA2040 Probability, Statistics and Stochastic Processes

July – November 2016:

MA5710 Mathematical Modeling in Industry

MA5740 Object Oriented Programming

January – May 2016:

MA5790 Computer Modeling and Simulation

MA5770 Modeling Workshop

MA2040 Probability, Statistics and Stochastic Processes

### **Professional Visits:**

- 1. Visiting Professor at MathematikInstitut, University of Koblenz-Landau, Germany under ERASMUS+, July 1 -15, 2018.**
- 2. Visiting Professor at MathematikInstitut, University of Koblenz-Landau under ERASMUS+, January 8 – 20, 2018.**
- 3. Visiting Professor at AG Technomathematik, TU Kaiserslautern, Germany & Fraunhofer ITWM, Kaiserslautern, Germany during the months May-July every year from 1994 to till date.**
4. Visiting Professor, Department of Mathematics, ITB Bandung, Indonesia during June 2009.
5. Visiting Professor, Department of Computational and Applied Mathematics, University of Witwatersrand, South Africa during August 2010.
6. Visiting Professor, Institute for Analysis and Numerik, University of Magdeburg, Germany during June 2003 and July 2005.
7. Visiting Professor AG Scientific Computing, TU Darmstadt, Germany during May 2004 and June 2005.
8. Visiting Professor, International Centre for Theoretical Physics (ICTP), Trieste, Italy during the month March 2004.
9. Visiting Faculty, School of Computational and Applied Mathematics, University of Witwatersrand, South Africa during the month December 1999.



### **Administrative Responsibilities:**

1. Head, Department of Mathematics, IIT Madras, Since December 2017.
2. DST-SERB, PAC Member (Mathematical Sciences), Since 2012.
3. Member of the Academic Council, IIT Madras Research Park, since 2013.
4. Chairman, JEE(Advanced)-2015, IIT Madras.
5. Chairman, HSEE-2014, IIT Madras.
6. Vice-Chairman, JEE(ADV)-2014, IIT Madras.
7. General Secretary, All India IIT Faculty Federation, 2014 – 2016.
8. President, Faculty Association, IIT Madras, 2013 – 2016.
9. Coordinator, Preparatory Courses 2015 – 16.
10. Member, Project Adhoc Recruitment Committee, ICSR, IIT Madras, 2013-15.
11. Member, Board of International Relations and Alumni Affairs, IIT Madras, since 2013.
12. Member, Academic Council, IIT Mandi, 2010 – 2015.
13. Member, Board of Studies, Anna University, since 2012.
14. Review Committee Member, Integrated Coastal and Marine Area Management”, Ministry of Earth Sciences, Govt. of India, 2011-12.
15. Review Committee Member , DST National program on Differential Equations, 2011.
16. Advisor, Cultural Affairs, IIT Madras, 2007 – 2010.
17. Member, Task force, IIT Hyderabad, 2009 – 2010.
18. Coordinator for DAAD Network Program on Differential Equations & Numerical Analysis, 2009-2013.
19. President, Staff Club, IIT Madras, 2006 – 2009.
20. Secretary, Faculty Association, IIT Madras, 2003-2005.
21. Vice-President, Faculty Association, IIT Madras, 2006.
22. Warden, Krishna Hostel, IIT Madras, 2003 – 2006.
23. Warden, Pamba Hostel, IIT Madras, 2005 – 2006.

**Served as Member, Selection Committee for various IITs, NITs, IISERs, IIITs, IIST, DRDO, ISRO and various Universities across India.**

### **Current MoUs:**

1. University of Koblenz-Landau, Germany under ERASMUS+ Exchange Program, Since January 2017.
2. University of TU Kaiserslautern, Germany under DAAD Exchange Program, Renewed from July 2018.
3. University of Wrocklaw University of Science and Technology, Poland under Students/Faculty Exchange, Since July 2018.