

Autumn Workshop on Advances in Differential Equations: Theory and Computation October 02-07, 2023

Thapar Institute of Engineering & Technology (TIET), Patiala 147004, Punjab, India



About the Workshop

Aim : The aim of this workshop is to facilitate knowledge exchange and collaboration among leading experts, mathematicians, physicists, and engineers, providing a platform for discussing new ideas and advancements in differential equations and their analytical and numerical solution. This workshop will bring together some of the leading experts in the field, presenting the most significant theoretical advances, and discussing applications including disease dynamics.

Scope: Differential equations play an important role in science and engineering applications, such as the propagation of heat or sound, fluid flow, elasticity, electrodynamics, tumor modeling, etc. In the course of studying these equations, it turns out that analytical and numerical questions are often closely related. In a series of lectures, participants will learn Sobolev spaces and weak formulation of partial differential equations, enabling them to understand the mathematical framework. They will then explore hyperbolic conservation laws and learn how to discretize hyperbolic equations using finite volume methods, enabling the simulation of physical phenomena with conservation properties. The workshop will also introduce high-resolution methods, equipping participants with techniques to mitigate numerical dissipation and capture sharp gradients in solutions. Additionally, participants will gain proficiency in finite element methods for elliptic PDEs, enabling them to tackle challenging problems with complex geometries and boundary conditions. Throughout the workshop, a significant focus will be placed on practical implementation, leveraging MATLAB as a powerful tool for numerical computation, visualization, and analysis. Finally, the workshop will culminate in the application of these numerical methods to disease dynamics, explore several mathematical models and simulate disease spread.

In order to enable an intensive exchange, to enhance the communication and lasting relationships, all the participants are encouraged to present their own work in a short talk or with a poster. By the end of the workshop, participants will have a solid foundation in numerical methods for differential equations, hands-on experience in MATLAB programming, and the ability to apply these tools in the context of disease dynamics, fostering their academic growth and research capabilities.

Speakers

- Prof. G. D. Veerappa Gowda (TIFR-CAM, Bengaluru)
- Prof. (Retired) V. Raghavendra (IIT Kanpur and IIT Tirupati)
- Prof. B. V. Ratish Kumar (IIT Kanpur)
- Prof. V. Sree Hari Rao (JNT University, Hyderabad and Foundation for Scientific Research and Technological Innovation, Hyderabad)
- Prof. Kapil K. Sharma (South Asian University, Delhi)
- Dr. Debdip Ganguly (IIT Delhi)
- Dr. Ram Jiwari (IIT Roorkee)
- Dr. Ravinder Singh (NIT Jalandhar)

Topics

- Sobolev spaces and weak formulation of PDE
- Hyperbolic conservation laws
- Finite volume methods for conservation law
- High resolution methods
- Finite element methods for elliptic PDE
- Disease dynamics
- Application of numerical methods in MATLAB

Organizing Committee

Chief Patron

Prof. Padmakumar Nair, Director, TIET, Patiala

Patron

Prof. Ajay Batish, Deputy Director, TIET, Patiala

Chairperson

Prof. Mahesh Kumar Sharma, Head, School of Mathematics, TIET, Patiala

Convener

Dr. Paramjeet Singh, Associate Professor, School of Mathematics, TIET, Patiala

Co-Conveners

Dr. Arvind Kumar Lal, Professor, School of Mathematics, TIET, Patiala
Dr. Vivek Sangwan, Assistant Professor, School of Mathematics, TIET, Patiala

Organizing Secretaries

Dr. Anuj Kumar, Assistant Professor, School of Mathematics, TIET, Patiala
Dr. Pramod Kumar Vaishnav, Assistant Professor, School of Mathematics, TIET, Patiala

About Thapar Institute

Thapar Institute of Engineering & Technology (TIET) is one of the oldest and finest educational institution, providing a steady source of highly skilled talent to the nation and overseas. Founded in 1956 with a campus spread across sprawling 250 acres, it is located in Patiala and has been a pioneer in engineering education, research, and innovation. Our community involves ingenious minds solvers who are eager to make the world a better place to live in with their innovative techniques and discoveries. Rated among the top-ranked innovation-driven private universities and technical institutes in the country, TIET has been accredited with an "A+" grade by the National Assessment and Accreditation Council (NAAC). We constantly evolve our teaching methods and provide quality education to our students, whom we see as unique individuals with different interests and aspirations. We keep the quality of our curriculum, faculty, and infrastructure unparalleled and believe in encouraging thousands of young minds to excel in India and abroad. Our alumni have stood out in varied fields such as business and industry, administrative and regulatory services, research and education, social and human rights organizations.

About School of Mathematics

School of Mathematics (previously known as School of Mathematics and Computer Applications) was established as an independent unit in 2015. The School of Mathematics is a dedicated academic unit contributing to the mission and vision of Thapar Institute of Engineering and Technology. School offers two programs at PG level, namely M.Sc. in Mathematics and Computing and M.Sc. in Mathematics. The masters' programs are designed to build strong foundations in core areas of higher mathematics and to provide extremely strong technical knowledge to the students who would typically take up careers – in academia or in industry. School offers Ph.D. program in various specializations of both pure and applied mathematics. School provides students with experiences that will assist them in achieving their career goal as leaders in mathematics. The school has a total of 38 well qualified faculty members from various research backgrounds especially in applied, pure, and computational mathematics. Several faculty members are working on sponsored research projects and guiding the PhD students.

Target Audience and Registration

Target Audience : Postgraduate students, Research students, Postdoctoral fellows, Young faculty members, and Researchers with a background in numerical analysis of differential equations from universities, institutions and R & D Organizations.

Registration : For Registration, please visit the URL:

<https://sites.google.com/view/adetc2023>

Registration Link: <https://forms.gle/qhfnf6fekuiD6cbA7>

Note that the seats are limited and last date of application is **August 31, 2023**.

Contact

Dr. Paramjeet Singh, Associate Professor
School of Mathematics, TIET, Patiala
E-mail: paramjeet.singh@thapar.edu
Phone: +91 96460 56500

Sponsors

