Title of Event :-Departmental Seminar by Dr. Asha Meena
Date of start of event :- 21st November 2024
Details of event :-
Speaker :- Dr. Asha Meena

Title of the Talk :- Robust and Efficient Numerical Schemes for Hyperbolic Partial Differential Equations

Date, Time and venue :- 21st Nov, 2024 at 3:00PM, @Meeting Room, Dept of Mathematics.

Abstract :- The systems of hyperbolic balance laws and system of hyperbolic non-conservative equations arise in several areas, especially in Computational Fluid Dynamics (CFD) and plasma flows. Due to lack of theory for the continuous problem, designing of stable numerical algorithms for the systems of hyperbolic PDEs is highly non-trivial. We are interested in higher-order numerical schemes for systems of hy-perbolic PDEs, e.g. Ten-Moment equations, Two-fluid plasma equations, Shear shallow water equations etc., which are robust and efficient. Robustness is achieved by designing positivity preserving and well-balanced numerical schemes. Positivity of the scheme is indeed desirable. Otherwise, we might lose the hyperbolicity of the system, and the solution produced by the numerical scheme will have no physical meaning. In particular, we consider finite volume method, finite difference method and Discontinuous Galerkin method. The WENO reconstructions are also used to get high order accuracy in finite difference and finite volume methods. The path-conservative schemes are used to tackle the non-conservative structure of the models. Further hybrid numerical strategies are considered to get efficiency in the available schemes. Here, we will discuss the design of these numerical schemes for fluid flow and plasma flow models and their performance by numerical experiments.

About the speaker :- Dr. Asha Meena is currently an Assistant Professor at Central University of Rajasthan. She has done Ph.D. from IIT Delhi and post doc from TIFR-CAM, Bangalore.Her broad research area is "Computational Methods for PDEs".