STRUCTURE-PRESERVING NUMERICAL METHODS FOR TWO DEGENERATE EQUATIONS

Speaker: Chenghua Duan
Shanghai Center for Mathematical Sciences

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Abstract: In this talk, by an energetic variational approach (EnVarA), we aim to construct structure-preserving numerical schemes for two kinds of degenerate parabolic equations: nonlinear Fokker-Planck equations with nonlocal interactions and porous medium equation. The algorithm can naturally keep the physical laws, such as positivity, the conservation of mass and energy dissipation in discrete system. Numerical simulations further reveal that our numerical schemes are capable of solving the degenerate equations effectively and robustly. It is shown that the developed numerical schemes have convergence order even in degenerate cases with the presence of solutions having compact support and can accurately compute the waiting time of free boundaries without any oscillation.