

11:50-12:25 Mihály Kovács (Pázmány Péter Catholic University, Budapest, Hungary; Budapest University of Technology and Economics, Budapest, Hungary; Chalmers University of Technology, Gothenburg, Sweden)

A regularized truncated finite element method for a degenerate parabolic stochastic PDE on non-compact graphs

Jianbo Cui (Department of Applied Mathematics, The Hong Kong Polytechnic University, Hong Kong), Mihály Kovács (Pázmány Péter Catholic University, Budapest, Hungary; Budapest University of Technology and Economics, Budapest, Hungary; Chalmers University of Technology, Gothenburg, Sweden), Derui Sheng (Department of Applied Mathematics, The Hong Kong Polytechnic University, Hong Kong)

We study the numerical approximation of a class of degenerate parabolic stochastic partial differential equations on non-compact metric graphs, which naturally arise in the asymptotic analysis of Hamiltonian flows under small noise perturbations. The numerical discretization of these equations faces several challenges, including the non-compactness of the graph, the degeneracy of the differential operator near vertices, and the non-symmetry of the associated bilinear form. To address these issues, we propose a multi-step numerical strategy combining graph truncation, localized coefficient regularization, and finite element spatial discretization. By incorporating localization techniques, tightness arguments and resolvent estimates, we establish the strong convergence of the proposed scheme in a weighted L2-space. Our results provide a systematic methodology that is potentially extensible to more general non-compact graphs and degenerate operators.