Computational and Applied Mathematics Seminar

Speaker

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Conservative Galerkin methods as adaptive algorithms for Hamiltonian PDEs

Abstract:
We investigate the construction of conservative methods for Hamiltonian PDEs, a large class of PDEs endowed with physically relevant geometric structures. Namely, these problems conserve an underlying Hamiltonian functional over time. They arise from a variety of areas, not least meteorological, such as the semi-geostrophic equations, and oceanographical, such as Korteweg-de Vries (KdV) type equations and the nonlinear Schrodinger equations. We describe a general methodology for the construction of spatial finite element discretisations which conserve a discrete Hamiltonian functional. Restricting our focus to KdV type equations we present a conservative spatial finite element method, which we couple with a discrete gradient method in time. We go on investigate the effects of spatial adaptivity over time on both stability and the conservative properties of our numerical scheme.