Title: Hybridizable discontinuous Galerkin methods for Korteweg-de Vries type equations

Abstract: Korteweg-de Vries (KdV) type equations are often used to model waves on shallow water surfaces and have applications in fluid mechanics, nonlinear optics, acoustics, and plasma physics. In this talk, we introduce new hybridizable discontinuous Galerkin (HDG) methods for solving KdV type equations. The HDG approximate solutions are defined by a discrete version of a characterization of the exact solution in terms of the solutions to local problems on each element which are patched together through transmission conditions on element interfaces. We prove that the semi-discrete schemes are stable with proper choices of stabilization function in the numerical traces. For the linearized equation, we show that the HDG approximations to the exact solution and its derivatives have optimal convergence rates. In numerical experiments, we use implicit schemes for time marching and HDG methods for spatial discretization, and we observe optimal convergence rates for both the linear and nonlinear KdV type equations.