Some Recent Advances in Hybridized Discontinuous Galerkin Methods

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ABSTRACT

We will present several new developments on the emerging *Hybridized Discontinuous Galerkin* (HDG) method. First, starting either from the Godunov upwind idea or from the Rankine-Hugoniot condition we derive a unified HDG framework for linear *PDEs* that allows one to uncover new HDG methods and recover most of the existing ones for a large class of PDE including the Friedrichs' systems. Analysis and numerical results for the unified framework will be presented. Second, we will present an *IMEX* scheme for the HDG method with application to atmospheric sciences. Third, we will present a multilevel HDG solver that is promising to be one of the fast and parallel solvers for large-scale problem. Fourth, we will present our work on parallel *hphphp* method for HDG methods. Finally, a non-conforming HDG will be introduced and analyzed.