Ultraweak formulation of linear elliptic PDEs in nondivergence form and DPG approximation

Thomas Führer[1], Norbert Heuer[1]

[1] Pontificia Universidad Catolica de Chile, Santiago, Chile

In this presentation I show how to define an ultraweak formulation for linear PDEs in nondivergence form where the coefficients satisfy the Cordes condition. These problems pop up, e.g., in the linearization of the fully nonlinear Hamilton–Jacobi–Bellman equations. Based on the ultraweak formulation we consider discontinuous Petrov–Galerkin (DPG) methods to obtain approximations. We also investigate fully discrete schemes using the theory of Fortin operators. The DPG methodology automatically provides us with local error indicators that can be used to steer local mesh-refinement.