AN L^1 MIXED DG METHOD FOR SECOND-ORDER ELLIPTIC EQUATIONS IN THE NON-DIVERGENCE FORM

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ABSTRACT

In this talk we present an L^1 mixed DG method for second-order elliptic equations in the non-divergence form. The elliptic PDE in non-divergence form arises in the linearization of fully nonlinear PDEs. Due to the nature of the equations, classical finite element methods based on variational forms can not be employed directly. In this work, we propose a new optimization based finite element method which combines the classical DG framework with recently developed L^1 optimization technique. Convergence analysis in both energy norm and L^∞ norm are obtained under weak regularity assumption of the PDE (H^1). Such L^1 optimization problems are nondifferentiable and invalidate traditional graidnet methods. To overcome this difficulty, we characterize solutions of L^1 optimization as fixed-points of proximity equations and utilize matrix splitting technique to obtain a class of fixed-point proximity algorithms with convergence analysis. In addition, various numerical examples will be displayed to validate the analysis in the end.

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