1057-65-321 **Ohannes Karakashian*** (`ohannes@math.utk.edu`), Mathematics department, University of Tennessee, Knoxville, TN 37996. *A Domain Decomposition Method for a Discontinuous Galerkin formulation for second-order elliptic equations.*

We consider the interior penalty discontinuous Galerkin (IPDG) formulation for second-order elliptic equations. In solving the resulting linear equations we use an additive Schwarz domain decomposition technique. As is well-known, the success of the method depends on the coarse mesh correction of the error. As is common in this context, we define the bilinear form on the coarse mesh to be the restriction of the bilinear form defined on the fine (working) mesh to the coarse subspace. It turns out that this introduces an incompatibility between the penalty terms in the two bilinear forms which is especially problematic when working with locally refined meshes. This incompatibility causes the condition number of the preconditioned matrix to be larger by an amount proportional to the ratio of the fine and coarse meshes.

We show that these difficulties are resolved by using a coarse subspace of H^1 thereby resulting in a hybrid CG-DG method. We present the theory and results of numerical experiments. (Received January 25, 2010)