

Preconditioning of DG FEM Elasticity Systems

B. Ayuso, I. Georgiev, J. Kraus, L. Zikatanov

We will present a preconditioning techniques for interior penalty discontinuous Galerkin (IP DG) finite element methods for linear elasticity problems in primal (displacement) formulation. We will recall some of their stability and approximation properties and comment on their suitability as a discretization tool for problems with nearly incompressible materials.

Next we propose a natural splitting of the DG space, which gives rise to uniform preconditioners. The presented approach was recently introduced by B. Ayuso and L. Zikatanov (2009) in the context of designing subspace correction methods for scalar elliptic equations and is extended here to linear elasticity.

Similar to the scalar case the solution of the linear algebraic system corresponding to the IP DG method is reduced to a solution of a problem arising from discretization by nonconforming Crouzeix-Raviart elements plus the solution of a well-conditioned problem on the complementary space.