

1056-65-1193

Andrew T. Barker* (andrewb@math.lsu.edu), Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803, and **Susanne C. Brenner**. *Parallel computation with the weakly over-penalized symmetric interior penalty method.*

Weakly over-penalized symmetric interior penalty methods have many desirable properties for parallel computing. These include small communication requirements at subdomain boundaries and intrinsic parallelism in the resulting matrix systems if the unknowns are ordered properly. The WOPSIP method, which is a non-conforming finite element method, shows promise for large-scale parallel computing because of this and because it is well-suited to adaptive refinement of meshes. We explore the possibilities of WOPSIP methods for the solution of PDEs on parallel computers, and compare these methods to other approaches including conforming finite elements. We also examine the effectiveness of several domain decomposition strategies for the WOPSIP method and present numerical results for model problems. (Received September 21, 2009)