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P. A. Lott* (Aaron.lott@nist.gov), National Institute of Standards & Technology, 100 Bureau Dr. Stop 8910, Gaithersburg, MD 20899-8910, and **H. C. Elman**, MD. *Fast Solvers for Models of Steady Fluid Flow*.

Numerical simulation provides insight into the effect physical parameters have on fluid flows under conditions that make physical experiments and theory intractable. However, these simulations are computationally demanding and in order to extend their applicability, highly scalable and efficient numerical methods are being developed. We discuss a novel block preconditioner based on domain decomposition and fast diagonalization that can be used to accelerate iterative solution methods. We then demonstrate how this technique provides an efficient means of simulating steady fluid flows. (Received September 21, 2009)