

Abstract proposed for presentation at ``Numerical methods for multi-material fluid flows,’’ Conference/workshop to be held at Czech Technical University in Prague, Czech Republic, September 10-14, 2007.

Consequences for scalability arising from multi-material modeling

J. Hu, S. J. Mosso, A. C. Robinson, Sandia National Laboratories*

T.A. Gardiner, Cray Inc.

J. E. Crepeau, Applied Research Associates, Inc.

Key to success of large scale computing is efficient use of computational resources. Multi-material modeling by very definition implies a potential load imbalance with respect to computing on a parallel architecture. We will present results in two different areas where material discontinuities impact scalability and performance. In the first case we describe the impact that significant material discontinuities have on an H(curl) algebraic multigrid method. In the second case we discuss scalability tradeoffs between interface reconstruction techniques of varying quality ranging from SLIC to a new 2nd order reconstruction algorithm. We will discuss how these results vary for two important large scale architectures including ASC Purple and Red Storm.

*Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.