

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

DSMC Studies of the Richtmyer-Meshkov Instability M.A. GALLIS, T.P. KOEHLER, J.R. TORCZYNSKI, Sandia National Laboratories — A new exascale-capable Direct Simulation Monte Carlo (DSMC) code, SPARTA, developed to be highly efficient on massively parallel computers, has extended the applicability of DSMC to challenging, transient three-dimensional problems in the continuum regime. Because DSMC inherently accounts for compressibility, viscosity, and diffusivity, it has the potential to improve the understanding of the mechanisms responsible for hydrodynamic instabilities. Here, the Richtmyer-Meshkov instability at the interface between two gases was studied parametrically using SPARTA. Simulations performed on Sequoia, an IBM Blue Gene/Q supercomputer at Lawrence Livermore National Laboratory, are used to investigate various Atwood numbers (0.33-0.94) and Mach numbers (1.2-12.0) for two-dimensional and three-dimensional perturbations. Comparisons with theoretical predictions demonstrate that DSMC accurately predicts the early-time growth of the instability. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

John Torczynski
Sandia National Laboratories

Date submitted: 21 Jul 2014

Electronic form version 1.4