

Abstract Submitted  
for the GEC16 Meeting of  
The American Physical Society

**Evaluation of the Aleph PIC Code on Benchmark Simulations.**

JEREMIAH BOERNER, JOSE PACHECO, ANNE GRILLET, Sandia National Laboratories, Thermal/Fluid Component Sciences — Aleph is a massively parallel, 3D unstructured mesh, Particle-in-Cell (PIC) code, developed to model low temperature plasma applications. In order to verify and validate performance, Aleph is benchmarked against a series of canonical problems to demonstrate statistical indistinguishability in the results. Here, a series of four problems is studied: Couette flows over a range of Knudsen number, sheath formation in an undriven plasma, the two-stream instability, and a capacitive discharge. These problems respectively exercise collisional processes, particle motion in electrostatic fields, electrostatic field solves coupled to particle motion, and a fully coupled reacting plasma. Favorable comparison with accepted results establishes confidence in Aleph's capability and accuracy as a general purpose PIC code. Finally, Aleph is used to investigate the sensitivity of a triggered vacuum gap switch to the particle injection conditions associated with arc breakdown at the trigger. 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.

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Date submitted: 10 Jun 2016

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