

Abstract Submitted
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Supersonic Nozzle Flow Using DSMC WILLIAM SOMERS, ADAM PAYNE, ANDREW SAMPSON, ROSS SPENCER, Brigham Young University — Fenix is a particle-in-cell Direct Simulation Monte Carlo (DSMC) computer simulation which models gas flow through an inductively coupled plasma mass spectrometer (ICP-MS). Particular attention is given to a nozzle region in the ICP-MS where gasses moving through a steep pressure gradient undergo a supersonic transition, expanding into a near vacuum environment. The physical behavior of the gasses in the nozzle region are closely studied, including interaction with the thermalized nozzle, incompressibility of the gas, and flow fields near the nozzle. Fenix has recently reached a stage of completion allowing our research group to produce pressure, temperature and velocity flow data for various regions in the ICP-MS. It is now necessary to verify the algorithms used in Fenix, and to check our work against other methods. Grahame Bird, one of the foremost experts in DSMC simulations, has made available to the public a general DSMC simulation which may be used to model the ICP-MS. Bird's simulation will be used to corroborate the data produced by Fenix, and the images of flow conditions for each method will be presented and compared.

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