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Hydrodynamic Simulations of Gaseous Argon Shock Experiments DANIEL GARCIA, DANA DATTELBAUM, PETER GOODWIN, JOHN MORRIS, Los Alamos National Laboratory, STEPHEN SHEFFIELD, Retired, MICHAEL BURKETT, Los Alamos National Laboratory — The lack of published Argon gas shock data motivated an evaluation of the Argon Equation of State (EOS) in gas phase initial density regimes never before reached. In particular, these regimes include initial pressures in the range of 200-500 psi (0.025 – 0.056 g/cc) and initial shock velocities around 0.2 cm/μs. The objective of the numerical evaluation was to develop a physical understanding of the EOS behavior of shocked and subsequently multiply re-shocked Argon gas initially pressurized to 200-500 psi through Pagosa numerical hydrodynamic simulations utilizing the SESAME equation of state. Pagosa is a Los Alamos National Laboratory 2-D and 3-D Eulerian hydrocode capable of modeling high velocity compressible flow with multiple materials. The approach involved the use of gas gun experiments to evaluate the shock and multiple re-shock behavior of pressurized Argon gas to validate Pagosa simulations and the SESAME EOS. Additionally, the diagnostic capability within the experiments allowed for the EOS to be fully constrained with measured shock velocity, particle velocity and temperature. The simulations demonstrate excellent agreement with the experiments in the shock velocity/particle velocity space, but note unanticipated differences in the ionization front temperatures.

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