Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Computational-hydrodynamic studies of the Noh compressible flow problem using non-ideal equations of state KEVIN HONNELL, SARAH BURNETT, CHLOE' YORKE, APRIL HOWARD, SCOTT RAMSEY, Los Alamos National Laboratory — The Noh problem is classic verification problem in the field of compressible flows. Simple to conceptualize, it is nonetheless difficult for numerical codes to predict correctly, making it an ideal code-verification test bed. In its original incarnation, the fluid is a simple ideal gas; once validated, however, these codes are often used to study highly non-ideal fluids and solids. In this work the classic Noh problem is extended beyond the commonly-studied polytropic ideal gas to more realistic equations of state (EOS) including the stiff gas, the Nobel-Abel gas, and the Carnahan-Starling hard-sphere fluid, thus enabling verification studies to be performed on more physically-realistic fluids. Exact solutions are compared with numerical results obtained from the Lagrangian hydrocode FLAG, developed at Los Alamos. For these more realistic EOSs, the simulation errors decreased in magnitude both at the origin and at the shock, but also spread more broadly about these points compared to the ideal EOS. The overall spatial convergence rate remained first order.

Kevin Honnell
Los Alamos National Laboratory

Date submitted: 21 Feb 2017 Electronic form version 1.4