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Verification Studies for the Noh Problem using Non-ideal Equations of State and Finite Strength Shocks SARAH BURNETT, University of Maryland, KEVIN HONNELL, SCOTT RAMSEY, ROBERT SINGLETON JR., Los Alamos National Laboratory — The Noh verification test problem is extended beyond the commonly studied ideal gamma-law gas to more realistic equations of state (EOS): including the stiff gas, the Nobel-Abel gas, and the Carnahan-Starling EOS for hard sphere fluids. Self-similarity methods are used to solve the Euler compressible flow equations, which in combination with the Rankine-Hugoniot jump conditions, provide a tractable general solution. In the planar case, this solution can be applied to any equation of state and does not necessarily have to exhibit strong shocks; for cylindrical and spherical geometries it is necessary that the analysis be restricted to strong shocks. The exact solutions are compared with numerical results obtained from the Lagrangian hydrocode FLAG. As the shock moves further from the wall, the simulation errors decreased in magnitude both at the origin and at the shock and also spread more broadly about these points. The overall spatial convergence rate remained first order. LA-UR-16-26903

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