Abstract Submitted
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Linear stability analysis of the Noh expanding-shock solution[1] M. MURAKAMI, ILE, Osaka University, Japan, A.L. VELIKOVICH, J.L. GIULIANI, Plasma Physics Division, NRL, B.D. TAYLOR, LCP&FD, NRL, S.T. ZALESAK, Berkeley Research Associates, Y. IWAMOTO, Ehime University, Japan — The self-similar one-dimensional (1D) solution of the Noh problem has been used for verification of every code designed to model implosions, explosions and shock waves. The long experience of successful verification of two- and three-dimensional (2D and 3D) hydrocodes against the 1D Noh solution is an implicit confirmation of its hydrodynamic stability. Still, as far as we know, stability analysis of the Noh solution has never been done. Here, such analysis is reported for spherical and cylindrical geometry assuming small-amplitude perturbations. In either case stability of the Noh solution has been demonstrated, all initial perturbations exhibiting a power-law, oscillatory or monotonic, decay with time. The dispersion equation determining the complex eigenvalues of the problem, i. e. the power indices characteristic of this decay, has been derived. Its numerical solution is presented, and the particular and limiting cases when the eigenvalues can be calculated analytically are outlined. Explicit formulas for the eigenfunction profiles corresponding to these eigenvalues are presented. The opportunities of using these new exact solutions for verification of hydrocodes in 2D and 3D are discussed.

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