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Numerical study of mixing induced by shock compression LILI WANG, Institute of Applied Physics and Computational Mathematics, Beijing, 100094, China — The mixing in a stratified cylindrical shell driven by cylindrical shock compression is numerically studied using the 7th order weighted essentially non-oscillatory shock-capturing method, combined with the 3th Runge-Kutta method. In order to investigate the effect of initial perturbations on the mixing growth, several different spectral shapes were introduced at the outer interface of the shell. In each case, random phases were assigned to each mode and randomized amplitudes were selected from the given spectrum. Three regimes were observed during the evolution history: (1) The shell implodes compressing the inner material. Two mixing zones grow at the shell surfaces due to the interfacial instability. (2) After the shock wave reaches the center and reflects outwards, the shell bounces off and moves back out. (3) At late-time the shell moves less and the two mixing zones grow quite steadily. If the shell is thin enough or the mixing has undergone enough time, the shell is broken up and the two mixing zones join to one. To characterize the mixing evolution, statistical quantities together with the mixing zone width were defined based on the simulation data, such as the actual product, maximum possible product, and mixing fraction. The flow features were analyzed using these measures. It was found that growth of the mixing zone is quite sensitive to the initial perturbation scale. The mixing zone grows more slowly with smaller scale perturbations. The imprint of initial perturbation spectra is obvious in early-time, but vanishes in late-time, except that the initial perturbation scale varies a lot.

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