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Multidomain spectral collocation method for three-dimensional perturbations in idealized CJ detonations ANATOLI TUMIN, CARLOS CHIQUETE, University of Arizona — The spectral collocation method for stability analysis of detonations allows computing the eigenvalue map for unstable modes. A multidomain version of the method provides more control over the distribution of the collocation points throughout the reaction zone. In the case of three-dimensional perturbations, the radiation condition that is usually used in the stability analysis is a nonlinear function of the eigenvalue, and it could not be incorporated explicitly into the spectral method. Recent rigorous asymptotic analysis of stability of detonations for an idealized condensed-phase model by M. Short et al. (JFM, 2008, Vol. 595, pp. 45-82) provides the radiation condition for three-dimensional perturbations that is a linear function of the eigenvalue for CJ detonations. The latter allows a direct inclusion of the radiation condition into the spectral method. In the present work, details of the multidomain spectral collocation method for CJ detonations are discussed. The results are illustrated by computations of eigenvalue maps for three-dimensional perturbations in gaseous and condensed-phase idealized one-dimensional detonations.

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