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Shock and initial disturbance induced initiation of the idealized condensed phase explosives. VIKTOR GORCHKOV, UIUC, GARY SHARPE, University of Leeds, MARK SHORT, LANL — Using a model of condensed phase explosive with reaction rate proportional to p^n (p is pressure and n is an adjustable parameter), we investigate detonation induced either by the passage of the shock or by an initial disturbance. A large n asymptotic analysis is performed. It shows that the evolution begins with an induction stage, followed by a sequence of pressure runaways, resulting in a propagating, decelerating weak detonation. Secondary shock and super-detonation (i.e. strong detonation) form once the weak detonation reaches the Chapman-Jouguet speed. We use parametric integration to obtain the path of the weak detonation and predict the time and location of the strong detonation formation. For small amplitude long wave length initial perturbation induced initiation we construct asymptotic solution. The path and the strong detonation formation point, given solely in terms of the initial pressure and velocity perturbations, are in good agreement with numerical solution. Numerical simulations for order $O(1)$ values of n show that idealized condensed phase model can qualitatively describe wide range of experimentally observed behaviors.

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