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Confinement Effect on Detonation Propagation in Condensed-Phase High Explosives CARLOS CHIQUETE, MARK SHORT, CHAD D. MEYER, JAMES J. QUIRK, Los Alamos Natl Lab — In applications that embed condensed-phase high explosives (HEs) in engineering scale geometries, the confining material's density and impedance have a strong influence on the resulting speed and front shape of the detonation wave in the HE. This is due to the post-shock flow divergence induced by the inert material yielding to the intense reaction zone pressures. Here, we systematically investigate this confinement effect on multi-dimensional detonation propagation. Specifically, we use a simplified HE model and stylized 2D planar and axisymmetric geometries. A shock-attached formulation of the reactive Euler equations is adopted and the post-shock flow divergence is mimicked by enforcing a (linear) boundary streamline at a prescribed deflection angle. The steady-state propagation of the wave is examined as a function of this angle including its phase velocity, detonation front pressure and the reaction zone structure. We focus on the transition from subsonic or confined flow along the boundary to supersonic flow when the detonation propagation becomes insensitive to further increases in flow divergence.

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