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Shock Polar Angles and Confinement Effect on Detonation Propagation CARLOS CHIQUETE, MARK SHORT, CHAD MEYER, JAMES QUIRK, JOHN BDZIL, Los Alamos National Laboratory — In high explosive (HE) engineering applications, the shape of a detonation front is influenced by the density and impedance of the inert material that surrounds the explosive. Where the detonation shock intersects the material boundary, a number of gasdynamic reflection patterns are possible involving shocks, Prandtl-Meyer fans and material interfaces. To leading-order, these reflection patterns can be predicted through a shock polar analysis. For the commonly used Detonation Shock Dynamics (DSD) front surface propagation model, the shape and evolution of the detonation wave is determined by the specification of the surface wave angle at the HE charge-confiner interface. Typically, the shock polar analysis is employed to approximate this necessary "edge angle" using specified equations of state for the HE-inert pair and a given phase velocity. For engineering applications, we need to evaluate how accurately a shock polar analysis can predict the DSD model edge-angle. We extend previous on this issue examining reactive flow simulations of detonation propagation in a confined HE compared to the predictions of a shock polar analysis.

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