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Coupling Detonation Shock Dynamics in a Consistent Manner to Equations of State WILLIAM BELFIELD, AWE — In hydrocode simulations, detonating high explosives (HE) are often modelled using programmed burn. Each HE cell is assigned a "burn time" at which it should begin to behave as HE products in the subsequent simulation. Traditionally, these burn times were calculated using a Huygens construction to propagate the detonation wave at a constant speed corresponding to the planar Chapman-Jouguet (CJ) velocity. The Detonation Shock Dynamics (DSD) model improves upon this approach by treating the local detonation velocity as a function of wave curvature, reflecting that the detonation speed is not constant in reality. However, without alterations being made, this variable detonation velocity is inconsistent with the CJ velocity associated with the HE products equation of state (EOS). Previous work [1] has shown that the inconsistency can be resolved by modifying the HE product EOS, but this treatment is empirical in nature and has only been applied to the JWL EOS. This work investigates different methods to resolve the inconsistency that are applicable both to JWL and to tabular HE product EOS, and their impact on hydrocode simulations. [1] Hetherington, D & Whitworth, N. "A simple model for the dependence on local detonation speed of the product entropy." AIP Conf. Proc. 1426. (2012)

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