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Effects of Inert Additives on Cyclotrimethylene-Trinitramine (RDX)/Trinitrotoluene (TNT) Detonation Parameters to Predict Detonation Synthesis Phase Production[1] MARTIN LANGENDERFER, CATHERINE JOHNSON, WILLIAM FAHRENHOLTZ, Missouri University of Science and Technology — The following methodology was developed to predict temperature and pressure regimes achieved during detonation of RDX/TNT compositions as they relate to the formation of solid carbon-based phases precipitating from the detonation process. This study computationally assesses the effects of inert material additives on explosive compositions used in detonation synthesis experiments. Thermomechanical and thermochemical models are used to evaluate detonation parameters starting with an explosive base composition of 50 wt.% RDX and 50 wt.% TNT. The effects of mesoscale inclusions and porosity created by inert additives on the sensitivity of the explosive composition to undergo a shock-to-detonation transition are estimated using a limited scope approach regarding hotspot formation and collapse. On the continuum scale, the effect of inert additives on pressure and temperature generated behind the detonation wave and within the reaction zone are parameterized through reactive burn modeling using the Becker-Kistiakowsky-Wilson (BKW) equation of state (EOS). The Jones-Wilkins-Lee (JWL) EOS is compared to the post reacted BKW model, and predicted state variables are input into thermochemical equilibrium modeling software to evaluate the state of the detonation products at various levels of expansion.

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