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Reacting Chemistry Based Burn Model for Explosive Hydrocodes MATTHEW SCHWAAB, ROBERT GREENDYKE, BRYAN STEWARD, Air Force Institute of Technology — Currently, in hydrocodes designed to simulate explosive material undergoing shock-induced ignition, the state of the art is to use one of numerous reaction burn rate models. These burn models are designed to estimate the bulk chemical reaction rate. Unfortunately, these models are largely based on empirical data and must be recalibrated for every new material being simulated. We propose that the use of an equilibrium Arrhenius rate reacting chemistry model in place of these empirically derived burn models will improve the accuracy for these computational codes. Such models have been successfully used in codes simulating the flow physics around hypersonic vehicles. A reacting chemistry model of this form was developed for the cyclic nitramine RDX by the Naval Research Laboratory (NRL). Initial implementation of this chemistry based burn model has been conducted on the Air Force Research Laboratorys MPEXS multi-phase continuum hydrocode. In its present form, the burn rate is based on the destruction rate of RDX from NRLs chemistry model. Early results using the chemistry based burn model show promise in capturing deflagration to detonation features more accurately in continuum hydrocodes than previously achieved using empirically derived burn models.

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