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On a calibration of a reaction rate model for explosive by a DSD-informed method SUNHEE YOO, Torch Technologies and Eglin AFB, CHAD RUMCHIK, Eglin AFB, SCOTT STEWART, Explosive Technology Consulting Services, LLC — The theory of detonation shock dynamics (DSD) applies to a model of an explosive with a specified reactant equation of state (EOS), products EOS, and a reaction rate law for reaction progress variable for the change from reactants to products. Given the assumed forms for the EOS, closure for the components and reaction rate law, a "DSD-informed" calibration uses experimental shock Hugnoiot data, plane shock initiation data, and shock curvature data and or diameter effect data. It has been found that DSD-informed reactive flow models are predictive of experimentally observed shock dynamics over a wide-range of conditions, once determined [1,2]. This paper discusses how to calibrate the EOS and reaction rate of Ignition & Growth (I&G) coupled with the reactive flow model. Previous methods of calibration generated a detonation shock speed, curvature relation (D-kappa) from theory and compared with an experimentally determined D-kappa relation. Our new procedure generates a shock shape across a rate stick from theory and compares it with shock shapes obtained from experiments. The procedure is carried out based on the sensitivity of completion term in the I&G model to D-kappa relation and of the reactant equation of state to the local shock shape at wall in a cylindrical explosive. References: 1. David E. Lambert, D. Scott Stewart, Sunhee Yoo and Bradley L. Wescott, J. Fluid Mech., 546, 227-253, (2006). 2. B. L. Wescott, D. Scott Stewart and W. C. Davis, J. Appl. Phys. 98, 053514 (2005).

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