Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Calibration of a macroscopic impact ignition model from simulations of shear band formation on the mesoscale YEHUDA PARTOM, Rafael — Relying on test results in [1] we propose in [2] a macroscopic impact ignition model in terms of the product PD (P=pressure, D=plastic deformation rate). Here we upgrade this model by taking into account the time duration of different PD levels. Our macroscopic impact ignition model is now based on, and calibrated from, 1D simulations of pure torsion on the mesoscale. We assume that impact ignition is invoked by shear localization and formation of shear bands. We denote by $(PD)_{Loc}$ the macroscopic shear localization threshold. When $PD>(PD)_{Loc}$ in a macroscopic cell, shear bands start to form there. The shear bands then develop and heat up towards the ignition temperature. We further assume that the time duration from localization to ignition $\Delta t=t_{ig}-t_{Loc}$ also depends on PD. Using 1D simulations of shear band formation in torsion, similar to [3], we calibrate $(PD)_{Loc}$ and $\Delta t(PD)$, which we can then use in macroscopic hydrocode simulations. Our mesoscale simulations depend on a realistic strength model for explosives. This model employs the overstress approach to dynamic viscoplasticity [4], and its main feature is pressure dependence of the plastic flow curve. 1. V. Boyle, R.B. Frey and O. Blake, 9^{th} Det. Symp., 3-17, 1989. 2. Y. Partom, 12^{th} Det. Symp., 831-834, 2002. 3. Y. Partom, SCCM 2015. 4. Y. Partom, DYMAT 2015, 94, 04003.

Yehuda Partom
Rafael

Date submitted: 07 Jan 2017 Electronic form version 1.4