Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

A hydrocode study of explosive shock ignition GEORGE BUTLER, AFRL/RWME/TEAS, YASUYUKI HORIE, AFRL/RWME — This paper discusses the results of hydrocode simulations of shock-induced ignition of PBXN-109, Octol, and PETN, using the History Variable Reactive Burn model in the CTH hydrocode. The simulations began with small-scale sympathetic detonation experiments, from which normalized values of pressure and time were derived and used to define an upper bound for ignition. This upper bound corresponds to the well established Pop-plot data for supported detonation, *i.e.* detonations in which a constant shock pressure is applied to an explosive until full detonation is achieved. Subsequently, one-dimensional flyer-plate simulations were conducted where the response of constant-amplitude, limited-duration shock pulses into semi-infinite explosive samples was examined. These simulations confirmed not only the existence of an upper bound for ignition as expected, but also showed ignition by "lower level" shocks, in which full detonation is reached at a time longer than the input shock duration. These lower-level shocks can be used to define a distinct minimal ignition threshold, below which shock pulses do not result in detonation. Numerical experiments using these bounds offer a new framework for interpreting explosive initiation data.

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Date submitted: 17 Feb 2011 Electronic form version 1.4