Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Theoretical study of the influence of the equation of state mixture properties on the velocity-curvature relationship for heterogeneous solid explosives CHRISTOPHE MATIGNON, NICOLAS DESBIENS, REMY SORIN, VINCENT DUBOIS, CEA, DAM, DIF — DSD is probably the most popular engineering tool used to model the dynamics of detonation. In this model the normal shock velocity (Dn) depends only on the local curvature (k) of the front. One way to reproduce this behavior is to construct a model for the explosive which obeys the 1D quasi-steady weakly curved detonation theory[1]. In its simplest form, such a model is composed of a reactive equation of state (ideal mixture of a burnt unburnt phases) coupled with a single step burning law. To complete the description of the reactive EOS different authors[2,3] proposed various closure hypotheses (isobaric isothermal, isobaric adiabatic, isodensity isothermal,...). Given this form of the EOS, the rate law is then calibrated to match the experimental detonation velocity-curvature curve. In this paper we theoretically examine the influence of the EOS closure hypotheses on the (Dn,k) curve. As the 1D curved theory of detonation is extremely sensitive to the calculation of the sonic surface downstream the reaction zone, we show that the effect of a particular closure law for the mixture can have a dramatic effect whenever it alters the sound speed calculation at the end of the reaction zone. [1]Stewart et al., Comb. Institute, 2000 [2]Wescott et al., JAP, 2005 [3]Matignon et al., 14th Int. Symp. Det., 2010

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Date submitted: 08 Feb 2011 Electronic form version 1.4