Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Simulation of the detonation process of an ammonium nitrate based emulsion explosive using the Lee-Tarver reactive flow model JOSE RIBEIRO, Mechanical Engineering Department, University of Coimbra, CRISTOVAO SILVA, RICARDO MENDES, IGOR PLAKSIN, JOSE CAMPOS, Mechanical Engineering Department, University of Coimbra, Portugal — The use of emulsion explosives [EEx] for processing materials (compaction, welding and forming) requires the ability to perform detailed simulations of its detonation process [DP]. Detailed numerical simulations of the DP of this kind of explosives, characterized by having a finite reaction zone thickness, are thought to be suitable performed using the Lee-Tarver reactive flow model. In this work a real coded genetic algorithm methodology was used to estimate the 15 parameters of the reaction rate equation [RRE] of that model for a particular EEx. This methodology allows, in a single optimization procedure, using only one experimental result and without the need of any starting solution, to seek for the 15 parameters of the RRE that fit the numerical to the experimental results. Mass averaging and the Plate-Gap Model have been used for the determination of the shock data used in the unreacted explosive JWL EoS assessment and the thermochemical code THOR retrieved the data used in the detonation products JWL EoS assessment. The obtained parameters allow a good description of the experimental data and show some peculiarities arising from the intrinsic nature of this kind of composite explosive.

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Date submitted: 23 Feb 2011 Electronic form version 1.4