Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Particle-Turbulence Interaction Model for Aluminum Combustion NEERAJ SINHA, WILLIAM CALHOON, JEREMY TOMES, CRAFT Tech — Particle-turbulence interactions will have a substantial impact on the performance of thermobaric explosives that rely on the particle combustion for secondary heat release. Modeling these interactions from a fundamental perspective is very difficult and intractable for large-scale problems of practical interest. Alternatively, these interactions may be modeled from a macroscopic perspective that seeks to account for the probability distribution function (PDF) of variables within the modeled laminar burning rate for the particulates. Such a formulation would account for the first order effect of turbulent fluctuations on the burning rate within a computationally affordable model. This paper will describe the development of such a model for aluminum particle combustion in both the diffusion and kinetic burning regimes. This formulation is based on an assumed PDF method that may be parameterized into a database that may be deployed within a flow solver. As a result, the formulation is computational efficient and affordable for large-scale simulations.

Neeraj Sinha
CRAFT Tech

Date submitted: 20 Dec 2010 Electronic form version 1.4