Abstract Submitted
for the TSS07 Meeting of
The American Physical Society

Kinetics Modeling Under Shock-Loading Conditions STEVEN VALONE, Materials Science and Technology Division, Los Alamos National Laboratory — Shock loading induces complex kinetic processes leading to such macroscopic phenomena as plastic deformation, phase transformations, and spall. The associated rates are typically modeled as first-order processes. The form of any rate constant is then assumed to be of an Arrhenius form [1]. This form of rate law assumes an equilibrium distribution of velocities in the system [2]. Clearly, in a shock-loaded system, the velocity distribution needs to be centered on the particle-velocity, u_p [3]. A revision in the Arrhenius rate model leads to u_p-dependent rate constants. At high shock loading, the rate constant naturally switches to a power-law dependence in keeping with observation.
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Date submitted: 06 Mar 2007 Electronic form version 1.4