Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

MD simulations of steady shock wave propagation in nickel BRIAN DEMASKE, VASILY ZHAKHOVSKY, University of South Florida, NAIL INOGAMOV, Landau Institute for Theoretical Physics, CARTER WHITE, Naval Research Laboratory, IVAN OLEYNIK, University of South Florida — Shock waves in nickel were simulated by molecular dynamics using a new EAM potential specifically developed to accurately describe dynamic material response to high-strain-rate deformations. A combination of novel moving window technique and standard piston shock simulations were performed to study different regimes of shock propagation. Four distinct shock regimes were observed, including single elastic wave, split elastic and plastic shock waves, steady two-zone elastic-plastic single wave, and overdriven plastic wave, in order of increasing piston velocity. The novel two-zone elastic-plastic single wave consists of a leading low-pressure elastic zone, followed by a high-pressure plastic zone, both moving with the same speed and having a fixed net width that may extend to many microns. We will discuss the fundamental features of shock-wave structure, as well as the possibility of observing two-zone elastic-plastic single waves in experiment.

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Date submitted: 08 Mar 2011 Electronic form version 1.4