Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Directional-dependence in shock-induced melting of fcc metals RAMON RAVELO, University of Texas-El Paso, B.L. HOLIAN, Los Alamos National Laboratory, T.C. GERMANN, Los Alamos National Laboratory, P.S. LOMDAHL, Los Alamos National Laboratory — Shock-induced melting in single crystals was investigated as a function of shock direction utilizing a new equilibrium molecular dynamics method for following the dynamical evolution of condensed matter subjected to shock waves[1]. The solid-liquid Hugoniots of Al, Cu and Lennard-Jones single crystals were enerated as a function of shock direction .The interatomic potentials describing Cu and Al are described by the embedded atom method (EAM). It is foound that in all these systems, the shear stresses at the shock-front dominate the melting process. As a function of orientation, melting occurs at lower pressures (temperatures) for (110) shocks and at higher pressures (temperatures) for (100) shocks. The magnitude of the shear stress at the melting pressure correlates with the orientations: (100):(111):(110) (smaller to largest value as a function of orientation).

[1]R. Ravelo, B.L. Holian, T.C. Germann and P.S. Lomdahl, Phys Rev B, 70, 014103 (2004).

Ramon Ravelo
University of Texas-El Paso

Date submitted: 01 Dec 2004 Electronic form version 1.4