Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Phenomenological viscous-elastic-plastic model of dynamic yield of Cu OLGA IGNATOVA, RFNC-VNIIEF — Taken together, the fundamental mechanisms that govern material flow under conditions of intensive loading comprise a multifaceted set, with each facet possessing its own domain of influence. These mechanisms include dislocation multiplication, grain size modification, twinning, and the formation of periodic shear bands during high-rate deformation. Existing flow stress models do not possess the capability of accounting for all of these mechanisms.Existing models are, for the most part, empirical. Those which attempt to account for the fundamental mechanisms responsible for material flow tend to be based on dislocation mechanics. Some include a number of internal state variables to try to account for history-dependent changes in morphology. None accounts for the full complexity of material behavior. An observation that can be made of existing models is that the greater the number of physical mechanisms accounted for, the greater the number of empirical parameters. In this work we present a new phenomenological elastic-viscoplastic flow stress model for M1 copper that accounts for variations in grain size, and does so with a reasonably small set of empirical parameters.

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Date submitted: 13 Feb 2007 Electronic form version 1.4