

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Finite size effects at high speed frictional interfaces¹ J.E. HAMMERBERG, R. RAVELO, T.C. GERMANN, B.L. HOLIAN, Los Alamos National Laboratory — Non-Equilibrium Molecular Dynamics simulations have exhibited characteristic velocity weakening for the tangential frictional force at smooth single crystal interfaces for velocities greater than a critical velocity, v_c . This behavior has been seen in a number of material pairs including Cu-Ag, Ta-Al and Al-Al. Expressions for v_c that characterize this behavior depend on system size. We discuss the size dependence for Al-Al single crystal interfaces for two cases: an Al(111)/Al(001) interface sliding along [1-10], $N=1.5M$, and an Al(110)[001]/Al(110)[1-10] interface sliding along [001], $N=7.5 \times 10^6$ corresponding to a three-fold increase in system size normal to the sliding direction. We find agreement with an inverse size scaling for v_c . We discuss the similarities in behavior for a highly defective plastically deformed sample with Al(110)[001]/Al(110)[1-10] orientation having the same normal dimension and $N=16.0 \times 10^6$.

¹This work supported by the U.S. Department of Energy under contract DE-AC52-06NA25396.

J.E. Hammerberg
Los Alamos National Laboratory

Date submitted: 10 Dec 2010

Electronic form version 1.4