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Influence of shock loading kinetics on the spall response of copper JUAN ESCOBEDO, DARCIE DENNIS-KOLLER, ELLEN CERRETA, BRIAN PATTERSON, CURT BRONKHORST, Los Alamos National Laboratory — A suite of plate-impact experiments was designed and conducted to examine the influence of loading kinetics on the spall response of high purity copper samples. The density of grain boundaries dynamically loaded and peak compressive stresses (1.5GPa) were held constant for all experiments. The kinetics of the tensile pulses were designed using a hydrodynamic shock-wave propagation code and experimentally achieved by controlling the geometry of copper impactors and targets. Examination of damage fields shows that the total fraction of damage (voids) decreases as the tensile rates increase. In addition, an accompanying larger plastic dissipation, in the form of grain misorientation measured by means of electron backscatter diffraction, is present in the samples deformed at lower tensile rates. These results suggest a time dependent behavior of the processes that convert plastic dissipation into void growth.

Juan Escobedo
Los Alamos National Laboratory

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