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High strain rate uniaxial compression of single and nanocrystalline copper VIRGINIE DUPONT, TIMOTHY C. GERMANN, Los Alamos National Laboratory — There is a great interest in the shock community to increase the reliability of models of the strength of metals under high strain-rate loading. This regime is difficult to access experimentally, and one way of getting more understanding in the mechanisms is to use molecular dynamics (MD) simulations. Moreover, MD simulations allow for a precise control of the strain rate, temperature and grain size. We are using MD simulations to study the influence of these parameters on the yield strength of Copper, for strain rates ranging from 10^8 to 10^{11} s^{-1}. Single crystalline simulations with different orientations will be presented, followed by polycrystalline studies with different grain sizes. We show that for single crystals, the orientation of the metal along the compression axis is critical for controlling the yield stress. For the polycrystalline simulations, the yield stress varies a lot more with strain rate than for the single crystal, and we show that as a result, smaller is not always stronger.

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