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Experimental observation and theoretical modeling of the effect of magnetic field on the strength of molybdenum under ramp wave compression[1] JOW DING, Washington State University, C. SCOTT ALEXANDER, JAMES ASAY, Sandia National Laboratories — A new experimental technique has been developed at Sandia National Labs to study the dynamic material strength at high pressures using "magnetically applied pressure shear (MAPS)" ramp waves. In order to apply sufficient shear traction to the test sample, the driver must have substantial strength. Molybdenum was selected for this reason along with its good electrical conductivity. It was observed that an imposed magnetic field of around 10 Tesla induced some annealing on molybdenum. Furthermore, when subjected directly to magnetohydrodynamic loading as encountered for the driver material, molybdenum exhibited an apparently stiff response and did not show a discernible elastic plastic transition. To better understand the experiments and establish a predictive capability for molybdenum, a tentative strength model that incorporates the possible magnetic effects including magnetic diffusion, Joule heating, and the coupling between the magnetic field and material strength has been developed. Experimental observations and the model will be discussed.

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