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Elastic-Plastic Deformation of Molybdenum Single Crystals Shocked along <100> ANIRBAN MANDAL, Y.M. GUPTA, Washington State University — To examine and understand elastic-plastic deformation in shocked Molybdenum (Mo), single crystal samples (99.99% purity) were shocked along <100> orientation. The peak longitudinal stress in our experiments was ∼12 GPa and sample thicknesses ranged between 0.23 and 2.3 mm. The Mo samples were backed by c-axis sapphire optical windows, and wave profiles were measured at the Mo/sapphire interface using laser interferometry (VISAR). A two-wave structure, expected from elastic-plastic deformation, was observed in all cases. Elastic wave amplitudes ranged between 2.9 and 4.2 GPa with an average value of 3.6 GPa. The scatter observed in the elastic wave amplitudes, though somewhat high, is comparable to that observed in a previous work on single crystals of tungsten, another bcc metal (T. E. Michaels, Ph. D. thesis, WSU). Measured wave profiles showed stress relaxation behind the elastic wave front for samples of 0.46 mm or larger in thickness. No obvious correlation could be established between the measured elastic wave amplitudes and the sample thicknesses examined. Relationship of the present results to slip systems postulated for Mo will be discussed. This work is supported by DOE/NNSA.

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