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Dynamic Plastic Response of Aluminum at Temperatures Approaching Melt STEPHEN GRUNSCHEL, RODNEY CLIFTON, Brown University — This study uses the pressure-shear plate impact configuration to investigate the rate-controlling mechanisms of the plastic response of metals at strain rates on the order of 10^6 s^{-1} and at temperatures that approach melt. In similar experiments by Frutschy and Clifton (*JMPS* **46,** 1998, 1723-1743) on OFHC copper, the flow stress decreases with increasing temperature and increases with increasing strain rate over the full range of temperatures and strain rates examined. No conclusive evidence of a change in rate-controlling mechanism was obtained. In the current study, temperatures that are larger fractions of the melting temperature are accessible because of the lower melting point of aluminum. So far, the shearing resistance has been measured at temperatures up to 630 C, which is 81% of the melting temperature at the concurrent pressure. Several approaches are being explored to obtain even higher fractions of the melting temperature, possibly exceeding it. Results of these approaches will be presented.

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