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Studying dynamic flow stress of lead at high pressure and high strain rates on NIF[1] PHILIP D. POWELL, CHANNING M. HUNTINGTON, ANDREW G. KRYGIER, JAMES M. MCNANEY, ROBERT E. RUDD, HYE-SOOK PARK, SHON PRISBREY, DAMIAN C. SWIFT, A. ARSENLIS, Lawrence Livermore Natl Lab, PETER GRAHAM, ANDREW COMLEY, STEVE ROTHMAN, AWE — Material plastic flow stress is expected to be influenced when a material's loading path causes a phase change in the solid from one crystal structure to another. In this study we investigate the dynamic strength of lead (Pb) at high pressure ($\sim$ 3.5Mbar) and high strain rates ($\sim 10^7 s^{-1}$) through Rayleigh-Taylor instability measurements on NIF. We employ a special ramp drive to a very low density foam reservoir in order to avoid sample melting during the initial pressure loading. In addition, target ripple patterns are designed to allow for differentiation of various Pb strength models, even when accounting for current uncertainties in model parameters. Finally, we develop a new Pb strength model to account for its change from the fcc phase at ambient conditions to the bcc phase at high pressures. In this talk, we present the design and initial results of our Pb strength experiments on NIF.

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