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Beryllium Strength under Extreme Dynamic Loading Conditions[1] MARC HENRY DE FRAHAN, University of Michigan, JON BELOF, ROB CAVALLO, Lawrence Livermore National Laboratory, OLGA IGNATOVA, RFNC-VNIIEF, ERIC JOHNSEN, University of Michigan, BRUCE REMINGTON, Lawrence Livermore National Laboratory, VICTOR RAEVSKY, RFNC-VNIIEF — Beryllium strength has been investigated under dynamic loading conditions using platforms that span a limited range of pressure and strain-rate space. Multiple Be strength models persist that are ostensibly calibrated to these experiments and yet predict different outcomes for results beyond the limited phase space where data exist. We discuss experiments using the high explosives (HE) to accelerate a solid rippled Be target quasi-isentropically. In this experiment a small HE charge is detonated nearby the Be sample. As the gaseous HE products expand they accelerate the target. The interface between the low-density gas and the perturbed face of the solid target is Rayleigh-Taylor (RT) unstable, and the amplitude of the ripples will grow with time. The ripple growth is mitigated by the strength of the Be. By measuring and modeling the amplitude growth we can discriminate among various strength models for Be. Our RT designs extend the pressures up to 50 GPa and the strain-rates near 10^6 s^{-1}. As a part of the design process we analyze existing plate impactor and Taylor anvil experiments using available models. In this paper we present the results of this analysis as well as the designs and preliminary experimental results from the RT experiments.

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