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High-Pressure Strength Determination via Quasi-Elastic Optimization Analysis JUSTIN BROWN, TRACY VOGLER, JIM ASAY, Sandia National Laboratories — The analysis of unloading profiles from ramp wave experiments on Sandia's Z machine for the purposes of extracting strength information can be greatly influenced by the presence of a window. An impedance mismatch between the sample and the window generates a reflected ramp wave which perturbs the incoming wave, particularly at later times when, during unloading, the material strength becomes evident. In an effort to analyze the waveforms for an accurate estimate of the strength, the experimental data is coupled with optimized numerical simulations. Simulations were performed with LASLO, a one-dimensional magneto-hydrodynamics code. The deviatoric response was calculated using a modified rate-independent Steinberg - Guinan model in which a quasi-elastic response was implemented during unloading by linearly varying the shear modulus. A best fit of relevant parameters in this strength model along with the magnetic field at the drive surface were estimated over the course of thousands of simulations using the Dakota optimization package. These results may then be used to estimate the in situ wave profiles from which the strength can be extracted. Initial results will be presented for ramp wave compression of tantalum with a lithium fluoride window to peak stresses of ∼120 GPa. Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin company, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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