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Inferring the High-Pressure Strength of Copper by Measurement of Longitudinal Sound Speed in a Symmetric Impact and Release Experiment STEPHEN ROTHMAN, RHYS EDWARDS, AWE plc., TRACY VOGLER, MIKE FURNISH, Sandia National Laboratory — Velocity-time histories of free- or windowed-surfaces have been used to calculate wave speeds and hence deduce the shear modulus for materials at high pressure. This is important to high velocity impact phenomena, e.g. shaped-charge jets, long rod penetrators, and other projectile/armour interactions. Historically the shock overtake method has required several experiments with different depths of material to account for the effect of the surface on the arrival time of the release. A characteristics method, previously used for analysis of isentropic compression experiments, has been modified to account for the effect of the surface interactions, thus only one depth of material is required. This analysis has been applied to symmetric copper impacts performed at Sandia National Laboratory's Star Facility. A shear modulus of 200Gpa, at a pressure of ∼180GPa, has been estimated. These results are in broad agreement with previous work by Hayes et al..

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