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**Pressure-Shear Plate Impact Experiments at Very High Pressures** CHRISTIAN KETTENBEIL, ZEV LOVINGER, SURAJ RAVINDRAN, MICHAEL MELLO, GURUSWAMI RAVICHANDRAN, California Institute of Technology, 1200 E. California Blvd., Pasadena, CA 91125 — Recent modifications of the powder gun facility at Caltech have enabled pressure shear plate impact (PSPI) experiments on materials at very high strain rates
($>10^7$ $s^{-1}$) and pressures (>20 GPa) that have not been reached before. The high strain rate/pressure regime expands significantly the advantages of this well studied technique, yet it requires a new approach for analysis of the experimental measurements to extract material's strength. At high pressures standard anvils such as tool steel and tungsten carbide do not remain elastic, and their inelastic behavior need to be accounted for in the analysis. In this work, we investigated the limits of different anvil materials and developed the requirements for anvils to withstand high pressures in the PSPI experiments, balancing ductility and strength. The methodology we have developed extracts the strength of the material in these experiments using a hybrid method, combining numerical simulations to simultaneously match both the normal and transverse free surface velocity measurements. The proposed methodology has the potential to expand the PSPI experiments to higher pressures, which may be also relevant to design and interpret MAPS experiments.

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