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Magnetically-Driven Isentropic Compression Status and Future Advances[1]

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Since the development of magnetically driven isentropic compression experiments (ICE) on the Z accelerator by Asay et al, this technique has continued to grow in maturity. At lower pressures, isentropic compression has been employed to identify and then study phase transitions and their kinetics. In addition, experiments have used the same techniques to study re-solidification, the response of explosives, and the crush up of porous materials. Most of these experiments rely on the ability of ICE to generate very smooth ramps that can be applied to multiple samples for relative experiments. For equation of state studies, the intrinsic accuracy and peak pressures continue to demand improvement in understanding, analysis techniques and diagnostics. We have spent significant effort in these areas over the last few years because we believe that we must demonstrate a well characterized and understood method to obtain accurate EOS data with well-behaved materials to give confidence in future comparisons between ICE data and calculations of material properties. In our presentation, we will discuss the status of Z experiments, our recent data at multi-megabar pressures with aluminum and other materials, and the status of our analysis abilities. We will also discuss the need for future improvements in diagnostics plus the anticipated capabilities of the ZR facility and the small pulser. This work was supported by the United States Department of Energy's National Nuclear Security Administration under contract No. DE-AC04-94AL85000. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company..

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