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A Simple Isentropic Compression Experiment (ICE) Machine
DOUGLAS TASKER, CHARLES MIELKE, GEORGE RODRIGUEZ, DWIGHT RICKEL, Los Alamos National Laboratory — A single-turn magnet pulsed power system at the Los Alamos National Laboratory (LANL) National High Magnetic Field Laboratory (NHMFL) was originally designed to measure actinide samples in extremes of high magnetic field (to 300 Tesla) ...[1, 2]. A simple modification to the system has converted it to a fast turnaround, inexpensive, magnetic isentropic compression system. For the design and predictions of performance of the NHMFL-ICE experiment a circuit code simulation was chosen to model all aspects of the experiment, electrical and physical. To this end, accurate dynamic load models were developed to simulate the compression and expansion of the dynamic load at high pressures using shock physics principles. This paper describes the potential performance of the system, recent experiments, and plans for a portable system. Portability will allow the machine to be used at various facilities such as the LANL proton radiography facility, LANSCE. To match the 2- μ s rise time of the system the sample dimensions can be up to 5 mm thickness. The maximum stresses are \sim 50GPa (0.5 Mbar) with the present design.

[1] S. E. Sebastian, *et al.*, *Procs. Natl. Acad. Sciences*, 107, 6175-6179.

[2] A. M. Alsmadi, *et al.*, *JAP* 105, 07E108-3.

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