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Thor: Modeling of a Megabar Class Pulsed Power Accelerator<sup>1</sup> T.A. HAILL, D.B. REISMAN, B.S. STOLTZFUS, K.N. AUSTIN, W.A. STYGAR, J.L. BROWN, J.-P. DAVIS, E.M. WAISMAN, Sandia National Laboratories — Thor is a compact, economical machine to drive megabar-class shockless compression material physics experiments and multi-mega-ampere HEDP experiments for the physics community. It is capable of driving peak currents up to 7 MA with rise times of 200-500 ns, resulting in material pressures between 1 to 5 Mbar depending upon the load design, and incorporates a pulse tailoring capability required to maintain shockless loading of many materials. Thor is modular in nature with 200 capacitive bricks triggered in groups by independent, de-coupled switches. The current pulse at the load is a simple linear combination of the 200 time-shifted basis pulses. This enables a variety of experiments including shockless compression experiments using smooth ramped pulses, shock-ramp compression experiments using tailored pulses, and strength measurement experiments using flat top pulses. This paper overviews the Thor design and describes an equivalent circuit model of the machine that drives MHD simulations of the load region. 3D ALEGRA MHD simulations explore topics such as the uniformity of the magnetic field along the stripline load and the design modifications to improve uniformity. Optimized current drives and simulations of the aforementioned applications are also presented.

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