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Development of 1D Liner Compression Code for IDL AKIHISA SHIMAZU, JOHN SLOUGH, William E. Boeing Department of Aeronautics & Astronautics, University of Washington, ANTHONY PANCOTTI, MSNW LLC — A 1D liner compression code is developed to model liner implosion dynamics in the Inductively Driven Liner Experiment (IDL) where FRC plasmoid is compressed via inductively-driven metal liners. The driver circuit, magnetic field, joule heating, and liner dynamics calculations are performed at each time step in sequence to couple these effects in the code. To obtain more realistic magnetic field results for a given drive coil geometry, 2D and 3D effects are incorporated into the 1D field calculation through use of correction factor table lookup approach. Commercial low-frequency electromagnetic fields solver, ANSYS Maxwell 3D, is used to solve the magnetic field profile for static liner condition at various liner radius in order to derive correction factors for the 1D field calculation in the code. The liner dynamics results from the code is verified to be in good agreement with the results from commercial explicit dynamics solver, ANSYS Explicit Dynamics, and previous liner experiment. The developed code is used to optimize the capacitor bank and driver coil design for better energy transfer and coupling. FRC gain calculations are also performed using the liner compression data from the code for the conceptual design of the reactor sized system for fusion energy gains.

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