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Applied Magnetic Field Design for the FRC Compression Heating Experiment (FRCHX) at AFRL MATTHEW DOMONKOS, Air Force Research Laboratory, D. AMDAHL, D. BROWN, F. CAMACHO, S. COFFEY, J. DEGNAN, R. DELANEY, M. FRESE, S. FRESE, D. GALE, C. GRABOWSKI, T. INTRATOR, J. MCCULLOUGH, N. MONTANO, R. ROBINSON, G. WURDEN — Detailed calculations of the dynamics of the formation, guide, and mirror applied magnetic fields were conducted using a commercially available generalized finite element solver. As part of the integrated FRC compression heating experiment (FRCHX), an applied magnetic field forms, translates and finally captures the FRC in the liner region sufficiently long to enable compression. Large single turn coils are used in the formation region, and detailed information on the magnetic field greatly enhances the fidelity of 2-D magnetohydrodynamic simulations using MACH2. Solenoidal coils produce the necessary magnetic field for translation and capture of the FRC prior to liner implosion. Since the liner implosion is underway before the FRC is injected, the magnetic flux that diffuses into the liner is compressed, and the calculations must account for the liner motion. Design iterations were performed using the detailed magnetic field solver with MACH2 to achieve both the coil design and operating parameters which resulted in the highest likelihood of FRC capture prior to compression. This work is funded by the U.S. Department of Energy Office of Fusion Energy Sciences.

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