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Modeling FRC Formation in Field Reversed Experiment – Liner LEONID DORF, THOMAS INTRATOR, RICHARD RENNEKE, SCOTT HSU, GLEN WURDEN, (LANL), THOMAS AWE, RICHARD SIEMON, (UNR), VLADIMIR SEMENOV, (IAP) — The Field Reversed Experiment - Liner (FRX-L) is creating high pressure FRC-s as target plasmas for magnetized target fusion (MTF), in which magnetically confined plasma will be compressed by an imploding aluminum liner to achieve fusion conditions. Magnetic design is critical to ensure success for formation, translation, and implosion of the FRC. In this work, we used an eddy current code that computes the mutual inductances between all active magnetic coils with driven currents and passive magnetic shields (flux excluder plates) to calculate the self-consistent axi-symmetric magnetic fields in all three stages. The plasma in the formation stage was simulated with a conductive cylinder of the dimensions typical for FRX-L plasmas. The modeling resulted in the following conclusions: (1) resistive diffusion of the magnetic field into the plasma causes the reconnection of the field lines, ultimately leading to formation of a field reversed configuration; (2) the calculated profile of the axial (dominant) component of the magnetic field, $B_z(z)$, predicts gradients of the magnetic pressure, sufficient for translating the FRC-s out of the formation region, and (3) the magnetic shields successfully protect the slow guide coils from the fast varying magnetic fields created in the formation region, while maintaining a desired $B_z(z)$ profile. Supported by OFES and LANL/DOE contract DE-AC52-06NA25396.

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