Abstract Submitted
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Observations of FRC Trapped Flux Lifetime Relative to Its Prolateness[1] CHRIS GRABOWSKI, Sandia National Laboratories, JAMES DEGNAN, MATTHEW DOMONKOS, DAVID AMDAHL, EDWARD RUDEN, Air Force Research Laboratory, GLEN WURDEN, THOMAS WEBER, Los Alamos National Laboratory — The Field-Reversed Configuration Heating Experiment (FRCHX) explored scientific issues associated with HED laboratory plasmas (HEDLPs) and phenomena relevant to magneto-inertial fusion in a closed-field-line plasma. To create the HEDLP conditions, a field-reversed configuration (FRC) of moderate density was formed via reversed-field theta pinch, translated into a solid liner where it was trapped between two magnetic mirrors, and then adiabatically compressed by solid liner implosion. Shortly following formation, the FRCs typically had a separatrix radius of 3˜3.5 cm, peak density of ˜10^{17} cm^{-3}, and temperature of ˜200 eV. The lifetime of trapped flux within the plasma was initially 13-16 μs following formation, or 8-11 μs once the FRC settled within the capture region. This was too short to allow complete compression by the solid liner, even when starting implosion before FRC formation. By moving the mirror coils 10 cm further apart, the magnetic well width increased by 6˜8 cm, which resulted in an increase in the trapped flux lifetime by 4˜5 μs. This presentation describes characteristics of the FRC plasmas prior to and following the lengthening of the capture region. From the literature, conclusions are made linking FRC stability and prolateness to FRC trapped flux lifetime.

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