Abstract Submitted
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Two-fluid simulations of counter-helicity spheromak merging and oblate FRC stability in MRX and SSX experiments[1] E.V. BELOVA, R.C. DAVIDSON, S. GERHARDT, Princeton Plasma Physics Laboratory, C. COTHRAN, Swarthmore College — Results are presented of 2D and 3D simulations of counter-helicity spheromak merging in MRX and SSX experiments using Hall-MHD version of the HYM code. The observable changes in global profiles caused by the local Hall effects, are seen even in the collisional regime, when the reconnection rate is comparable to the MHD reconnection rate. Dependence of the reconnection rate on plasma resistivity is studied, and it is found to be similar to the scaling reported for the magnetic islands coalescence problem. These results are compared with MRX and SSX measurements. Three-dimensional MHD simulations have been performed in order to investigate stability properties of oblate FRCs. In was shown that strong equilibrium field shaping can stabilize the $n = 1$ tilt mode in oblate FRCs, and improve stability of the $n > 1$ MHD modes. The numerically-calculated structure of the perturbed magnetic field has been used to identify the most unstable modes in MRX experiments. It has been shown that the effects of external field shaping are much weaker for higher-n modes due to the more localized structure of these modes. Numerical simulations have also been performed to identify the effects of the central conductor and the residual small toroidal field on the stability properties of MRX-FRC plasmas.

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