Abstract Submitted
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Three-dimensional Hall-MHD simulations of counter-helicity spheromak merging and FRC formation[1] E.V. BELOVA, R.C. DAVIDSON, H. JI, M. YAMADA, S.P. GERHARDT, PPPl, M. INOMOTO, Osaka University — Initial results are presented of 2D and 3D simulations of counter-helicity spheromak merging using Hall-MHD version of the HYM code. In the code, the Hall electric field is subcycled on the ideal MHD time scale, which decreases the computational time by a factor of five compared to explicit numerical scheme. Calculations are performed for values of normalized ion skin depth comparable to that in counter-helicity spheromak merging experiments $d_i = 0.03 - 0.05$. Hall-MHD simulation show significant differences of the radial current, toroidal magnetic field and radial flow profiles compared to the resistive MHD simulations. Depending on the polarity of the initial toroidal fields, the reconnection X-point is shifted downward or upward in radial direction, the radial current contours have "V"-shaped (or inverted "V") structure, and radial component of ion flow is strongly non-symmetric relative to X-point. These results are explained by the structure of the electron flows, and found to be in agreement with MRX measurements.

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