Abstract Submitted
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Simulation studies of FRC with rotating magnetic field current drive[1] E.V. BELOVA, R.C. DAVIDSON, PPPL — The HYM code has been modified to include the effects of rotating magnetic field (RMF) current drive. Initial 3D two-fluid and hybrid simulations have been performed for even-parity RMF and different plasma parameters. Simulations show that the RMF pushes the plasma radially inward, resulting in a reduced plasma density outside the separatrix. Lower plasma density and larger RMF amplitudes result in faster RMF field penetration, in agreement with previous studies [R. Milroy, Phys. Plasmas 8, 2804 (2001)]. Effects of the applied RMF field on particle confinement have been studied using 3D test particle simulations. Simulations of stationary RMFs show that for relatively large ion Larmor radius ($S^* < 20$), there is very little difference between even- and odd-parity RMFs in terms of the ion losses. The rate of particle losses is larger in larger FRCs, and increases with the RMF amplitude. In contrast, high-frequency RMF can reduce ion losses provided $\omega_{rmf} \gg \omega_{ci}$, and the RMF is of even-parity. The improved particle confinement is related to ponderomotive forces due to the rapidly oscillating, inhomogeneous electromagnetic field. It is also found that high-frequency, odd-parity RMFs force particles away from the midplane toward the FRC ends.

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