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Simulation Studies of Field-Reversed Configurations with Rotating Magnetic Field Current Drive[1] E.V. BELOVA, R.C. DAVIDSON, PPPL — Results of 3D kinetic simulations of rotating magnetic field (RMF) current drive in field-reversed configuration (FRC) are presented. Self-consistent hybrid simulations have been performed using the HYM code for even- and odd-parity RMF and different FRC parameters and RMF frequencies. Simulations show that the RMF pushes the plasma radially inward, resulting in a reduced plasma density outside separatrix. Lower plasma density and larger RMF amplitudes result in faster RMF field penetration, in agreement with previous two-fluid studies. Generation of axisymmetric toroidal magnetic field during the RMF current drive has been observed. Numerical study of the effects of the applied RMF field on particle confinement shows that the rate of particle losses increases for RMF frequency close to the ion cyclotron frequency. It is also shown that high-frequency even-parity RMF reduces ion losses when it is fully penetrated. It is also found that fully-penetrated, odd-parity RMF forces particles away from the midplane toward the FRC ends. The observed changes in particle confinement are related to ponderomotive forces. Partially penetrated RMF results in mostly radial ponderomotive forces which improve particle confinement in both cases.

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