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Including electron kinetic effects in FRC simulations[1] ELENA BELOVA, R.C. DAVIDSON, PPPL — A kinetic description for the electrons has been implemented in the 3D nonlinear hybrid HYM code, where the electrons are described as delta-f drift kinetic particles. Initial conditions are generated assuming that electron distribution function is a function of the three integrals of motion, and the electron temperature is fraction of the ion temperature. Numerical benchmarks have been performed in order to verify conservation laws, and study the accuracy of electron orbit integration depending on the electron time step. A new version of the HYM code with drift-kinetic electron description has been used to study the effects of kinetic electrons on FRC equilibrium and relaxation. It is shown that both parallel and perpendicular electron pressure evolves from the initial peaked profile towards hollow profiles with local minimum near the FRC magnetic null point. Comparisons of the two-fluid simulation results and the drift-kinetic electrons simulation results demonstrate that the ions spin up faster, when the drift-kinetic electron model is used. Initial results of 3D simulations studying the effects of kinetic electrons on the FRC stability will be presented.

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