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Hybrid Kinetic-MHD Studies of FRC's using Lorentz δf PIC in Finite Elements CHARLSON C. KIM, RICHARD D. MILROY, Plasma Science and Innovation Center - U. Wash, NIMROD TEAM — We report progress on the extension of the drift kinetic δf Particle-in-Cell (PIC) module[1] to a Lorentz force model for the NIMROD code. Resolution, both temporal and spatial, of the full Lorentz orbit is necessary to capture the energetic ion physics in Field Reversed Configurations (FRC). The Lorentz force PIC module will be used to study the effects of energetic ions on stability and confinement of FRC's. We will present 3D visualization using VisIt[2] of the equilibrium trajectories that reveal surprising order. Visualization of the equilibrium trajectories of energetic ions reveal geometric features analogous to closed flux surfaces but with more complex morphologies. We also present linear simulations of energetic ion effects on the tilt stability of the FRC. These initial simulation results will examine the successes and shortcomings of the implementation and possible paths to improvements. We conclude with some remarks on potential application of the full Lorentz PIC and its impact on tokamak simulations.

[1]C. C. Kim "Impact of velocity space distribution on hybrid kinetic-magnetohydrodynamic simulation of the (1,1) mode", Phys. Plasmas 15, 072507 (2008)
[2]https://wci.llnl.gov/codes/visit/

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