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Global simulation of field-reversed configuration using fully kinetic ion and drift kinetic electron[1] CALVIN LAU, University of California, Irvine, DANIEL FULTON, Tri Alpha Energy, Inc., ANIMESH KULEY, JIAN BAO, ZHIHONG LIN, University of California, Irvine, MICHAEL BINDERBAUER, Tri Alpha Energy, Inc., TOSHIKI TAJIMA, University of California, Irvine; Tri Alpha Energy, Inc., LOTHAR SCHMITZ, University of California, Los Angeles, THE TAE TEAM TEAM — In the last several years, the C-2/C-2U advanced beam-driven field-reversed configuration (FRC) experiments at Tri Alpha Energy have progressed to consistent, reproducible plasma lifetimes of 10+ ms, i.e. FRCs have reached transport limited regimes. In FRC geometry, the thermal ion gyroradius is on the order of the size of the plasma near the magnetic null-point. Fast ion orbits intersect both the FRC core and the scrape-off layer (SOL) regions. Previous local simulations of electrostatic drift-wave instabilities using the Gyrokinetic Toroidal Code (GTC) find the core to be robustly stable with driftwave instability only in the SOL at frequencies approaching the ion cyclotron frequency[2,3]. Therefore, FRC transport studies require fully kinetic ion simulations with cross-separatrix coupling between the core and SOL. Here we report progress of such global simulations using fully kinetic ions and drift kinetic electrons, including the implementation of the Boris push scheme for cyclotron motion and cylindrical coordinates for the separatrix.

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[2]D. P. Fulton et al, Phys. Plasmas 23, 012509 (2016)
[3]D. P. Fulton et al, Phys. Plasmas 23, 056111 (2016)

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