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Integrated Modeling of Stability and Transport of FRC Plasmas S.A. DETTRICK, D.C. BARNES, F. CECCHERINI, L. GALEOTTI, S. GUPTA, K. HUBBARD, C. LAU, TAE Technologies, Inc, Z. LIN, University of California, Irvine, Y. MOK, A. NECAS, M. ONOFRI, S. PUTVINSKI, P. YUSHMANOV, T. TAJIMA, TAE Technologies, Inc, TAE TEAM — In TAE Technologies' current experimental device, C-2W (also called "Norman") [1], record breaking, advanced beam-driven field reversed configuration (FRC) plasmas are produced and sustained in steady state utilizing variable energy neutral beams, expander divertors, end bias electrodes, and an active plasma control system. We give an overview of our "Numerical FRC" integrated modeling effort, which includes interpretive and predictive work on the equilibrium, stability, and transport of C-2W FRC plasmas. Fast particles from neutral beam injection (NBI) are modelled using a full orbit Monte Carlo code. This is used to calculate fast ion contributions to hybrid kinetic+thermal equilibria, to compute source terms in experimental plasmas which have been reconstructed with Bayesian Inference, and to augment a 2D extended MHD code to create a global transport model which includes NBI, electrode biasing, expander divertors, and neutral gas. FRC states computed from these 2D models are analyzed for 3D effects using the ANC code which models electrostatic turbulence, and the FPIC code which models global stability under the influences of NBI, electrode biasing, and magnetic field shaping. [1] H. Gota et al., Nucl. Fusion 59, 112009 (2019).

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