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FRC as a Two-Fluid Flowing Relaxed State BRADLEY SCOTT NICKS, LOREN STEINHAUER, THE TAE TEAM, TAE Technologies — Various theories have been posited to address the preferred (relaxed) states of a plasma as well as the underlying physical principles that select the preferred state. Previous work [1,2] has indicated that under certain conditions, the preferred configuration of a plasma is a field-reversed-configuration (FRC). As finite-beta effects, strong flows, and two-fluid effects are well-known aspects of FRC experiments, here a relaxation model of two flowing fluid species with constrained species helicity and minimized magneto-fluid energy is used to predict a preference for FRC states within certain helicity regimes. While prior work has focused on classifying relaxed states, here the full relaxed magnetic and flow functions are numerically solved on an ellipsoidal geometry. Flow is allowed in both the toroidal and poloidal directions. First, a uniform density is taken, and then a varying density is allowed. Different regimes of species helicity are examined. In all cases, electron inertia is neglected. Finally, the constraint of conserved angular momentum is applied, and the effects on the relaxed state are evaluated. [1] L. C. Steinhauer, H. Yamada, and A. Ishida, Phys. Plasmas 8, 4053 (2001) [2] R. Bhattacharyya, M. S. Janaki, and B. Dasgupta, Phys. Lett. A 291, 291 (2001)

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