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Progress minimizing fast-ion charge-exchange loss associated with gas injection on C-2W ERIK GRANSTEDT, S.A. DETTRICK, M.E. GRISWOLD, THE TAE TEAM, TAE Technologies, Inc. — In TAE Technologies' current experimental device, C-2W (also called "Norman")[1], beam-driven field reversed configuration (FRC) plasmas are produced and sustained in steady-state using neutral beams (up to 20 MW, 15–40 keV), advanced divertors, end bias electrodes, and an active plasma control system. Particle injection throughout the discharge is necessary to maintain electron density, since titanium deposited on the walls and cryogenic surfaces adsorb incident particles. Gas injection in various locations complements fueling from neutral beam injection, which is insufficient alone. Unfortunately, neutrals from gas fueling can also be a charge-exchange target for fast-ions. DEGAS2 neutral particle modeling is used to estimate the neutral distribution from each source, followed by Monte Carlo fast-ion modeling to calculate charge-exchange losses. Results are compared to images of Balmer-α emission from filtered, high-speed cameras and other diagnostics. Fast ions are found to be particularly sensitive to gas injection near the midplane, while minimally affected by gas injection in the mirror throat. Other observations and further improvements to reduce fast-ion charge-exchange will also be discussed.

[1]H. Gota, et al. Nuclear Fusion 59, 112009 (2019)

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