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Electric field profile measurements in C-2W from impurity ion radial momentum balance MARCEL NATIONS, DEEPAK GUPTA, DMITRY OSIN, SANGEETA GUPTA, AND THE TAE TEAM, TAE Technologies, Inc. — In the C-2W experiment [1], edge biasing is used to drive rotation, stabilize, and heat an advanced beam-driven field-reversed configuration (FRC) plasma embedded in a magnetic mirror. Highly charged oxygen impurity ions that exist in the plasma are sensitive to biasing effects and their azimuthal rotational velocity magnitude and direction are dependent on the applied electrode bias voltage and polarity, respectively. The radial momentum balance equation for impurity ions is utilized to extract the local electric field near the mid-plane of the confinement vessel. A multi-chord passive Doppler spectroscopy diagnostic targeting the O^{4+} triplet lines near 278 nm is used to measure impurity ion temperature, density, and azimuthal velocity profiles. Results show that for biased plasmas the diamagnetic term inside the separatrix is small relative to the $E \times B$ force term which drives the O^{4+} rotation. These findings are consistent with other experimental observations and computational equilibrium reconstruction of C-2W plasma. [1] H. Gota et al., Nucl. Fusion **59**, 112009 (2019).

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