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Plans and Progress of Electrode Biased Plasmas in the Magnetic Reconnection Experiment E.H. MARTIN, S.P. GERHARDT, M. YAMADA, H. JI, Y. REN, S. DORFMAN, H. TORREBLANCA, PPPL — Compact Toroid (CT) plasmas such as Spheromaks are known to exhibit a global instability known as the tilt mode, where the magnetic moment of the CT tilts to align itself with the external magnetic field, as well as other non-rigid body instabilities. Possible tilt stabilizing mechanisms for these instabilities include external field shaping, nearby passive stabilizers, and plasma rotation. The proposed research focuses on reducing the growth of the tilt instability by introducing toroidal rotation in spheromaks formed in MRX. Rotation is introduced by the use of interior and exterior electrodes; the result is a J_{bias} x $B_{internal}$ torque on the CT plasma which in turn leads to toroidal rotation of the CT plasma. In order to power the bias electrode a 450 V 8800 μF capacitor bank capable of delivering up to 450 amperes was constructed along with the required control and triggering circuitry. Solid state switches allow for fast turn on and turn off times of J_{bias}. The bias current and the voltage drop across the electrodes are measured using a current shunt and voltage divider respectively, and the resulting flow is measured with a Mach probe. Internal arrays of magnetic probes and optical diagnostics will be used to parameterize the performance of the CT plasma during bias. Construction and testing of all necessary components and diagnostics is complete; preliminary results will be presented.

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