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Modeling of flow-dominated MHD instabilities at WiPPAL using NIMROD[1] K. FLANAGAN, K.J. MCCOLLAM, J. MILHONE, V.V. MIRNOV, M.D. NORNBERG, E.E. PETERSON, R. SILLER, C.B. FOREST, University of Wisconsin-Madison — Using the NIMROD (non-ideal MHD with rotation - open discussion) code developed at UW-Madison, we model two different flow scenarios to study the onset of MHD instabilities in flow-dominated plasmas in the Big Red Ball (BRB) and the Plasma Couette Experiment (PCX). Both flows rely on volumetric current drive, where a large current is drawn through the plasma across a weak magnetic field, injecting $\mathbf{J} \times \mathbf{B}$ torque across the whole volume. The first scenario uses a vertical applied magnetic field and a mostly radial injected current to create Couette-like flows which may excite the magnetorotational instability (MRI). In the other scenario, a quadrupolar field is applied to create counter-rotating von Karman-like flow that demonstrates a dynamo-like instability. For both scenarios, the differences between Hall and MHD Ohms laws are explored. The implementation of BRB geometry in NIMROD, details of the observed flows, and instability results are shown.

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