

Abstract Submitted  
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**Investigations of stationary tokamak states in MHD using NIMROD**<sup>1</sup> K. J. MCCOLLAM, B. E. CHAPMAN, M. D. PANDYA, J. S. SARFF, UW-Madison, D. L. BROWER, J. CHEN, UCLA, W. X. DING, USTC — Using the extended-MHD code NIMROD, we perform linear and nonlinear simulations of zero- and finite-beta MHD in toroidal geometry oriented toward stationary tokamak states. A previous study by Jardin, Ferraro, and Krebs (PRL 2015) utilizing the MHD code M3D-C1 identified a class of such states, maintained by continuous dynamo action corresponding to a saturated interchange mode, such that the safety factor  $q$  was held slightly above 1 and sawteeth were absent. Our NIMROD simulations begin with linear stability tests of tokamak equilibria with on-axis  $q(0)$  values slightly below 1. Initial comparisons of unstable  $n = 1$  modes show noticeably different mode structures for zero and finite beta (of a few percent), reminiscent of an earlier comparison by Krebs et al. (POP 2017). We have begun nonlinear simulations starting from similar equilibrium cases, aiming to explore the conditional boundaries between sawtoothing and non-sawtoothing tokamaks.

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Karsten McCollam  
University of Wisconsin - Madison

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