Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Stability Analysis for Advanced Tokamak Plasmas on DIII-D[1]
M.W. ASLIN, Mount Holyoke College, K.E. THOME, General Atomics, B.S. VICTOR, Lawrence Livermore National Laboratory — The advanced tokamak is a high-performance plasma regime intended to be the operational steady-state scenario for tokamak fusion. High q_{min} plasmas are such a regime and are currently being developed on DIII-D. These high q_{min} plasmas typically have $q_{min} > 1.5$. Some of these high-performance discharges are destabilized by magnetohydrodynamic (MHD) tearing modes, spoiling the high performance of the plasma. A good understanding of the stability of these high q_{min} plasmas and the onset of these tearing modes is crucial to the success of this scenario. Stability analysis has been performed on many high q_{min} discharges on DIII-D. EFIT and CORSICA are used to generate equilibria for the ideal DCON stability code. Beta limits are found by calculating the stability of equilibria after systematically increasing the plasma pressure. In this work, scans of toroidal and poloidal grid resolution, edge q, and whether to fix current density or q after increasing the plasma pressure are used to determine optimal parameters. No-wall and ideal-wall beta limits are then correlated to the onset of tearing modes in high q_{min} plasmas. A stability database for these discharges has also been generated to assist in predictions for the onset of MHD tearing modes.

[1]Work supported by US DOE under WDTS SULI, DE-FC02-04ER54698(GA), and DE-AC52-07NA27344 (LLNL).

Mary Aslin
Mount Holyoke College

Date submitted: 07 Jul 2020 Electronic form version 1.4