Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Overview of mode control methods on the HBT-EP tokamak[1] J.P. LEVESQUE, J.W. BROOKS, R.N. CHANDRA, BOTING LI, M.E. MAUEL, G.A. NAVRATIL, A. SAPERSTEIN, I.G. STEWART, Y. WEI, Columbia University, C. HANSEN, University of Washington — We present an overview of recent and upcoming experiments for feedback-controlling kink and tearing modes on the High Beta Tokamak – Extended Pulse (HBT-EP). Mode amplitude and phase for feedback are determined using either magnetic sensors or chord-integrated extreme ultraviolet (EUV) emission. Feedback algorithms are implemented using a Graphics Processing Unit (GPU)-based controller. Actuators include arrays of biasable electrodes located inside the plasma and at its edge, as well as in-vessel magnetic control coils near the plasma surface. Current injected by the probes follows a path aligned with the edge field helicity, naturally producing fields with appropriate geometry for mode control. The feedback systems are able to suppress or amplify modes, and control rotation frequency. Upcoming control experiments will include adding biasable tiles in the scrape-off layer (SOL), and utilizing SOL current sensors in the feedback loop. One mission of this work is to develop robust mode control techniques that do not require 3D magnetic coils, applicable to a reactor environment.

[1]Supported by U.S. DOE Grant DE-FG02-86ER53222.

Jeffrey Levesque
Columbia University

Date submitted: 29 Jun 2020 Electronic form version 1.4