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Investigation of Multi-Mode Plasma Response in HBT-EP[1] N. RATH, J. BIALEK, P.J. BYRNE, B. DEBONO, J.P. LEVESQUE, B. LI, M.E. MAUEL, D.A. MAURER, G.A. NAVRATIL, D. SHIRAKI, Columbia University —
The new measurement and control system of the HBT-EP tokamak was designed to investigate multi-mode plasma dynamics under a variety of plasma and control coil configurations. We aim to identify optimal control coil configurations and quantify the flexibility available for designing and configuring active feedback systems. Experimental data will also be used to systematically validate the VALEN multi-mode modeling code and thereby facilitate the transfer of all results to next-step devices like ITER. In this poster we present first computational and experimental results. The TokaMac and DCON codes are used to find equilibria with favorable multi-mode kink stability properties. We show that the installation of "zero-net-turns" shaping coils provides experimental control of the plasma response by reducing the external kink resonance of limited discharges and changing the coupling of $n = 1$ and $n = 2$ RWMs. Experiments were aimed at reproducing the computed equilibria and exciting the desired multi-mode responses with different control coil configurations. Actual equilibria are reconstructed using 216 magnetic sensors and pressure profile information. Measured mode dynamics are compared to simulations.

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