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**HBT-EP Research Program: Advancing Active Mode Control**[1]
G.A. NAVRATIL, P.J. BYRNE, B. DEBONO, J.P. LEVESQUE, B.Q. LI, M.E. MAUEL, D.A. MAURER, N. RATH, D. SHIRAKI, Columbia University — HBT-EP (http://www.seas.columbia.edu/apam/hbtep/) active mode control research is advancing ITER and fusion relevant modular feedback control coil configurations and their impact on kink mode rigidity, advanced control algorithms, and the effects of plasma rotation on MHD mode stability. This poster our plans to use our recently enhanced active mode control facility (i) to quantify external kink dynamics and multimode response to applied magnetic perturbations, (ii) to develop and understand the relationship between control coil configuration, conducting and ferritic wall configuration, and active feedback control effectiveness, and (iii) to explore advanced feedback control algorithms and internal feedback control coil configurations that are ITER and reactor relevant. Together with our successful high-speed multiple-input-output (MIMO) digital control system, an improved capability from the VALEN 3D feedback modeling code, and a very highly-instrumented control wall, we aim to optimize the use of modular feedback coils to control instability growth near the ideal wall stabilization limit, answer critical questions about the role of plasma rotation in active control of the Resistive Wall Mode (RWM) and the Ferritic Resistive Wall Mode (FRWM), and improve the performance of control systems used in fusion experiments.

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