

Abstract Submitted  
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**HBT-EP External Kink Mode Control Research Program: Recent Progress and Future Plans** G.A. NAVRATIL, B. DEBONO, J.M. HANSON, R. JAMES, J.P. LEVESQUE, M.E. MAUEL, D.A. MAURER, T.S. PEDERSEN, D. SHIRAKI, Columbia University — HBT-EP MHD mode control research is studying advanced Kalman filter control algorithms, ITER relevant internal modular feedback control coil configurations and their impact on kink mode rigidity, and the effects of edge neutral damping as a dissipation mechanism on the kink mode. HBT-EP incorporates a segmented adjustable conducting wall and 40 internal modular feedback control coils driven by a high-speed MIMO digital control system for external kink mode control. Primary research thrusts are to test advanced feedback control algorithms to increase feedback noise immunity, and the study of the physics of kink rotation stabilization by controlled variation of critical parameters such as dissipation and mode rotation. Recent results include measurement of the radial magnetic eigenmode structure and density and temperature perturbations of the external kink, and observation of  $D_\alpha$  profiles and fluctuations during MHD spectroscopy experiments to quantify edge neutral dissipation. Enhancements of the VALEN modeling code, along with the design and construction of a new passive stabilizing wall and feedback coil system to study control coil modularity and coverage issues and their impact on kink mode rigidity will also be presented. \*Supported by U.S. DOE Grant DE-FG02-86ER53222.

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