

Abstract Submitted  
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**HBT-EP Active Mode Control Research: Progress and Plans\***

G.A. NAVRATIL, J.M. HANSON, A.J. KLEIN, Y. LIU, M.E. MAUEL, D.A. MAURER, T.S. PEDERSEN, N. STILLITS, J. BIALEK, A.H. BOOZER, O. KATSUROHOPKINS, Columbia University, S.F. PAUL, Princeton University, R. JAMES, USCG Academy/Stevens Inst. Tech. — HBT-EP MHD mode control research is studying advanced digital feedback 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 RWM rotational stabilization. HBT-EP incorporates a segmented adjustable conducting wall, internal modular feedback control coils driven by a high-speed (10 microsecond delay) MIMO digital control system for resistive wall modes (RWM) and a biased electrode for edge rotation control. Primary research thrusts are to: (1) study required feedback gain as a function of control coil modularity and toroidal angle coverage testing possible breakdown in ‘rigid mode’ kink model; (2) test advanced feedback control techniques of adaptive filtering and state estimation, (3) study physics of RWM rotation stabilization by controlled variation of critical parameters (rotation, dissipation, and growth rate). Recent results including measurement of the radial eigenmode structure of the external kink and its dependence on plasma dissipation, enhancements of the VALEN modeling code, development of reduced state space models, and initial kink rigidity studies will be discussed. \*Supported by U.S. DOE Grant DE-FG02-86ER53222.

David Maurer  
Columbia University

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