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HBT-EP Program: Active MHD Mode Dynamics & Control[1]
G.A. NAVRATIL, S. ANGELINI, J. BIALEK, A.H. BOOZER, P. BYRNE, A.J. COLE, B. DEBONO, K. HAMMOND, P. HUGHES, J.P. LEVESQUE, M.E. MAUEL, Q. PENG, N. RATH, D. RHODES, D. SHIRAKI, C. STOAFER, F.A. VOLPE, Columbia University, I. CZIEGLER, UCSD, S. PAUL, PPPL — The HBT-EP active mode control research program aims to (i) quantify external kink dynamics and multimode response to applied magnetic perturbations, (ii) understand the relationship between control coil configuration, conducting and ferritic wall effects, and active feedback control effectiveness, and (iii) explore advanced feedback algorithms. Biorthogonal decomposition is used to observe multiple simultaneous resistive wall modes (RWM) with m<9 and n<5. Transitions were observed for m/n=4/1 to 3/1 accompanied by 7/2 to 6/2. Non-rigid mode behavior is observed with independent 3/1 and 6/2 RWMs. Active MHD spectroscopy is used to study 3/1 resonant field response showing linear, saturated, and ultimately, disruptive behavior as the external field amplitude is increased. Using an improved GPU based MIMO digital control system with VALEN 3D feedback modeling, we aim to optimize modular feedback coils to control instability growth near the ideal wall limit.

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Gerald Navratil
Columbia University

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