Abstract Submitted
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HBT-EP Program: MHD Dynamics and Active Control through 3D Fields and Currents[1] G.A. NAVRATIL, M.C. ABLER, J. BIALEK, J.W. BROOKS, P.J. BYRNE, S. DESANTO, P.E. HUGHES, J.P. LEVESQUE, M.E. MAUEL, D.J. RHODES, Columbia University, C.J. HANSEN, University of Washington — The HBT-EP active mode control research program aims to: (i) advance understanding of the effects of 3D shaping on advanced tokamak fusion performance, (ii) resolve important MHD issues associated with disruptions, and (iii) measure and mitigate the effects of 3D scrape-off layer (SOL) currents through active and passive control of the plasma edge and conducting boundary structures. A GPU-based low latency control system uses 96 inputs and 64 outputs to control the plasma boundary. An in-vessel adjustable ferritic wall is used to study ferritic RWMs with increased growth rates, RMP response, and disruptivity. A quasi-linear sharp-boundary model is developed to study effects of toroidal curvature and plasma shaping on beta limits with resistive plasmas and walls. Measurement of currents between vessel sections reveals currents running from the plasma to the wall during wall-touching kink modes and disruptions. Asymmetries in plasma current are observed using segmented Rogowski coils. Biased electrodes in the plasma are used to control rotation of external kinks and drive currents in the SOL. An extensive array of SOL current monitors and edge drive electrodes will be installed for pioneering studies of helical edge current control.

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