Abstract Submitted
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HBT-EP Program: MHD Dynamics and Active Control through 3D Fields and Currents[1] G. A. NAVRATIL, J. BIALEK, J. W. BROOKS, R. N. CHANDRA, J. P. LEVESQUE, BO-TING LI, M. E. MAUEL, A. SAPERSTEIN, I. G. STEWART, Y. WEI, Columbia University, C. J. HANSEN, University of Washington — The HBT-EP active mode control research program aims to: (i) understand the physics of scrape-off layer currents (SOLC) and interactions between the helical plasma edge and conducting boundary structures, (ii) test new methods for measurement and mode control that integrate optical and magnetic detector arrays with both magnetic and SOLC feedback, and (iii) understand fundamental MHD issues associated with disruptions, resonant magnetic perturbations (RMP), and SOLC. An extensive set of SOLC sensor tiles attached to the movable outer wall and fixed inner wall have been installed, and used to study SOLC dynamics and current-sharing with the vacuum vessel wall during application of RMPs, kink-mode growth, and disruptions. A biased electrode in the plasma edge was used to induce a strong layer of sheared ExB flow with a transition into a biased H-mode and suppression of edge plasma turbulence. A 64-chord extreme UV/soft X-ray array has been installed to provide detailed internal MHD mode structure information, and was used to demonstrate for the first time kink-mode active feedback control using only non-magnetic sensor input into a GPU-based low latency control system. This GPU control system has also been extended to use driven local plasma current for active MHD mode control.

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