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, P.J. BYRNE, S. DESANTO, J.P. LEVESQUE, M.E. MAUEL, I.G. STEWART, Columbia University, C.J. HANSEN, U. 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. Comparison of kink mode structure and RMP response in circular versus diverted plasmas shows good agreement with DCON modeling. SOL current measurements have been used to study SOL current dynamics and current-sharing with the vacuum vessel wall during kink-mode growth and disruptions. A multi-chord extreme UV/soft X-ray array is being installed to provide detailed internal mode structure information. Internal local electrodes were used to apply local bias voltage at two radial locations to study the effect of rotation profile on MHD mode rotation and stability and radial current flow through the SOL. A GPU-based low latency control system using 96 inputs and 64 outputs to apply magnetic perturbations for active control of kink modes is extended to directly control the SOL currents for kink-mode control. An extensive array of SOL current monitors and edge drive electrodes are being installed for pioneering studies of helical edge current control.

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