Abstract Submitted
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Magnetics Design and Calibration for Multimode Plasma Response Measurements on HBT-EP D. SHIRAKI, B. DEBONO, J.P. LEVESQUE, M.E. MAUEL, D.A. MAURER, G.A. NAVRATIL, T.S. PEDERSEN, N. RATH — Accurate measurements of multimode plasma magnetic response are important for quantifying the effects of a variety of MHD phenomena. A new array of 216 poloidal and radial magnetic sensors has been designed, installed, and calibrated on the HBT- EP tokamak to measure multimode kink dynamics under feedback control. The new system provides double the toroidal resolution for real-time feedback over the previous system, as well as two complete poloidal and one complete toroidal array for high mode-number detection. A Monte Carlo simulation was used to determine the required accuracies, and a combination of bench and a new novel in-situ calibration were used to achieve this required performance. The in-situ calibration was carried out with four current ring sources which were built and installed in the vacuum chamber during an up to air period near the location of the plasma core, as well as the external vertical field, ohmic heating, and toroidal field coils. This calibration procedure is based on a linearized least squares algorithm to verify the location and orientation of each individual sensor. The new system will allow extensive multimode RWM studies, high mode-number feedback, and more accurate MHD spectroscopy detection of possible non-rigid, multimode kink dynamics. Supported by U.S. DOE Grant DE-FG02-86ER53222.

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