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Inverted Extreme Ultraviolet Emissivity Profiles: Towards Fully Nonmagnetic Active Control of Kink Modes[1] R.N. CHANDRA, J.P. LEVESQUE, J.W. BROOKS, M.E. MAUEL, G.A. NAVRATIL, Columbia University — Active feedback in tokamaks with magnetic sensors and actuators has been well established, from vertical position to RWM control. However, engineering constraints in reactor-scale devices may push sensor and feedback coils outside of the first wall or blanket, reducing attainable frequency response. Furthermore, previous magnetic feedback studies could not discriminate between disruptive external modes, and potentially benign internal ones without further diagnostic information. As a possible solution, the HBT-EP tokamak has installed a 64 chord extreme ultraviolet fan array (sensitive to 15-1000eV photons) for use as sensors together with a 22 μS cycle time Nvidia GPU system and voltage probe actuator. The goal of this study is to determine a basis set and discretization for tomographic recovery of the emissivity profile, which best enables real time discrimination and tracking of internal and external modes. Possible candidates such as Fourier-Bessel, local basis functions (the pixel method), and the Singular Value Decomposition of a reference shot are examined. Progress on kink mode control using these methods is reported.

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