

Abstract Submitted  
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**Advanced feedback control of resistive wall modes with high speed GPU on HBT-EP**<sup>1</sup> QIAN PENG, NIKOLAUS RATH<sup>2</sup>, JEFFREY LEVESQUE, DOV RHODES, REBECCA ARBACHER, PATRICK BYRNE, MICHAEL MAUEL, GERALD NAVRATIL, Columbia University — The HBT-EP tokamak can excite strong, saturated kink modes whose growth rates and rotation frequencies evolve on a millisecond timescale. To control such modes, HBT-EP uses a GPU-based feedback system in a low latency architecture. Up to 80 feedback sensors are used to detect the rotating kink mode, which is used by the feedback algorithm to calculate the desired current on the 40 control coils. We are able to suppress the fast rotating mode with feedback using poloidal sensors, but the performance with high gain is limited by the excitation of a low frequency rotating wall mode [1]. We report a study aimed at improving the performance through several ways, including: (a) adapting an algorithm that uses both radial and poloidal sensors, and (b) tracking the state of the modes using a Kalman filter.

[1] N. Rath, et al, Plasma Phys. Control. Fusion 55 (2013) 084003 (9pp).

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<sup>2</sup>Now in Tri Alpha

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