Abstract Submitted
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Non-Model-Based Optimal Fluctuation Mitigation by E×B Actuation in HELCAT[1] QIAOQIAO WANG, EUGENIO SCHUSTER, Lehigh University, SHUANGWEI XIE, MARK GILMORE, University of New Mexico, ANDREW WARE, University of Montana — Turbulence, and turbulence-driven transport are ubiquitous in magnetically confined plasmas, where there is an intimate relationship between turbulence, transport, destabilizing mechanisms like gradients and currents, and stabilizing mechanisms like shear. We investigate active control of fluctuations via manipulation of flow profiles in a magnetized laboratory plasma device (HELCAT). Fluctuations and particle transport are monitored by electrostatic probes, and E×B flow profiles controlled via biased ring electrodes. A non-model-based optimization algorithm is implemented to seek control inputs that minimize a cost function related to the fluctuation amplitude. The algorithm is also able to identify radial poloidal flow profiles associated with low RMS fluctuations. The long-term goal is to develop model-based feedback controllers to regulate the radial poloidal flow profiles around the identified low-fluctuation profiles.

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