Abstract Submitted
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Optimal Azimuthal Velocity Profile Control by E×B Actuation in HELCAT[1] ZEKI ILHAN, EUGENIO SCHUSTER, Lehigh University, SHUANG-WEI 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). Measurements of the azimuthal velocity are assumed available at several radial points within the plasma and E×B flow profiles are controlled via biased ring electrodes. An optimal control algorithm is designed to regulate the radial azimuthal velocity profile around a prescribed desired profile. The effectiveness of the controller and the effect of the shape of the radial azimuthal velocity profile on RMS fluctuations are analyzed via numerical simulations.

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Eugenio Schuster
Lehigh University

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