

Abstract Submitted
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Current Density Profile Control via Model Predictive Control in EAST.¹ HEXIANG WANG, WILLIAM WEHNER, EUGENIO SCHUSTER, Lehigh University, LEHIGH UNIVERSITY PLASMA CONTROL TEAM — Extensive studies have shown that the current density profile, which is closely related to poloidal magnetic flux profile, is a key factor to achieving advanced tokamak operating scenarios that are characterized by improved confinement and possible steady-state operation. In this work, a first-principles-driven, control-oriented model of the poloidal magnetic flux profile evolution is used to design a feedback controller via model predictive control (MPC) for EAST. The goal of the feedback controller is to regulate the poloidal magnetic flux profile evolution around a desired trajectory by minimizing the difference between desired and actual profiles. Due to external disturbances, non-modeled dynamics, and perturbation in initial conditions, feedforward-only control solutions usually fail in achieving the desired trajectory. Simulation results illustrate the capability of the proposed model predictive controller in tracking the desired profile by optimizing in real time the actuator waveforms.

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