Abstract Submitted
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Development of Integrated Magnetic and Kinetic Control-oriented Transport Model for q-profile Response Prediction in EAST Discharges[1] HEXIANG WANG, EUGENIO SCHUSTER, TARIQ RAFIQ, ARNOLD KRITZ, Lehigh University, SIYE DING, Institute of Plasma Physics, Chinese Academy of Sciences — Extensive research has been conducted to find high-performance operating scenarios characterized by high fusion gain, good confinement, plasma stability and possible steady-state operation. A key plasma property that is related to both the stability and performance of these advanced plasma scenarios is the safety factor profile. A key component of the EAST research program is the exploration of non-inductively driven steady-state plasmas with the recently upgraded heating and current drive capabilities that include lower hybrid current drive and neutral beam injection. Anticipating the need for tight regulation of the safety factor profile in these plasma scenarios, a first-principles-driven (FPD)control-oriented model is proposed to describe the safety factor profile evolution in EAST in response to the different actuators. The TRANSP simulation code is employed to tailor the FPD model to the EAST tokamak geometry and to convert it into a form suitable for control design. The FPD control-oriented model's prediction capabilities are demonstrated by comparing predictions with experimental data from EAST.

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