Abstract Submitted
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Model-based control development for KSTAR enabled by TRANSP[1] MARK BOYER, XINGQIU YUAN, FRANCESCA POLI, Princeton Plasma Physics Laboratory, HYUN-SEOK KIM, SANG-HEE HAHN, NFRI, EUGENIO SCHUSTER, SHIRA MOROSOHK, Lehigh University, STEVE SABBAGH, JAE-HEON AHN, Columbia University, WILLIAM WEHNER, General Atomics — Model-based control and scenario development will be critical for reaching the highest possible performance of KSTAR and future fusion devices like ITER. Key to the model-based approach is the development of a hierarchy of models of varying fidelity, execution speed, and complexity, suited to different roles in the design process. These approaches are being actively developed for KSTAR to enable reaching many of the scientific goals of the device, including ramp-up optimization, non-inductive scenario optimization, and rotation and current profile control. For this work, both analytic and data-driven reduction methods have been used, with the TRANSP integrated modeling code serving as the foundation of the modeling hierarchy. Initial control algorithms and design tools have been developed that will enable accelerated offline and real-time model-based decision making in future experimental campaigns. The reduced models and TRANSP have been integrated with the control design software Simulink. This enables a hierarchy of models to be used to validate control algorithms prior to experiments, which will accelerate the commissioning process. Several recent results in these areas will be covered along with plans for future development and applications.

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