Abstract Submitted
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Multivariable Model-based Shape Control for the National Spherical Torus Experiment (NSTX)[1] WENYU SHI, EUGENIO SCHUSTER, Lehigh University, MICHAEL WALKER, DAVID HUMPHREYS, General Atomics, DAVID GATES, EGEMEN KOLEMEN, Princeton Plasma Physics Laboratory — Because of the coupling between the different geometrical parameters, multi-input-multi-output (MIMO) model-based shape controllers are necessary to achieve the very stringent plasma shape requirements in highly-efficient tokamaks. Leveraging the availability of rtEFIT, we propose a robust model-based MIMO controller to provide real-time shaping and position control of the plasma in NSTX. The proposed controller is composed of three loops that transform the shape control problem into a tracking problem. A singular value decomposition of the plasma model is carried out to define the weights associated to the tracking errors. The H_∞ technique is used to minimize the tracking errors and optimize input efforts. Computer simulation results illustrate the performance of the robust shape controller, showing the potential for improving the performance of present non-model-based controllers.

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