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Modeling and control of plasma rotation and β_n for NSTX-U using Neoclassical Toroidal Viscosity and Neutral Beam Injection IMENE GOUMIRI, CLARENCE ROWLEY, Princeton Univ, STEVEN SABBAGH, Columbia Univ, DAVID GATES, STEFAN GERHARDT, MARK BOYER, PPPL — A model-based system is presented allowing control of the plasma rotation profile in a magnetically confined toroidal fusion device to maintain plasma stability for long pulse operation. The analysis, using NSTX data and NSTX-U TRANSP simulations, is aimed at controlling plasma rotation using momentum from six injected neutral beams and neoclassical toroidal viscosity generated by three-dimensional applied magnetic fields as actuators. Based on the momentum diffusion and torque balance model obtained, a feedback controller is designed and predictive simulations using TRANSP will be presented. Robustness of the model and the rotation controller will be discussed.

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