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**Reduced-order-model based feedback control of the Modified Hasegawa-Wakatani equations** IMENE GOUMIRI, CLARENCE ROWLEY, ZHANHUA MA, Princeton University, DAVID GATES, Princeton Plasma Physics Laboratory, JEFFREY PARKER, Princeton University, JOHN KROMMES, Princeton Plasma Physics Laboratory — In this study, we demonstrate the development of model-based feedback control for stabilization of an unstable equilibrium obtained in the Modified Hasegawa-Wakatani (MHW) equations, a classic model in plasma turbulence. First, a balanced truncation is applied; a model reduction technique that has been proved successful in flow control design problems, to obtain a low dimensional model of the linearized MHW equation. A model-based feedback controller is then designed for the reduced order model using linear quadratic regulators (LQR) then a linear quadratic gaussian (LQG) control. The controllers are then applied on the original linearized and nonlinear MHW equations to stabilize the equilibrium and suppress the transition to drift-wave induced turbulences.

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