1105-93-140 **Lizette Zietsman*** (lzietsma@vt.edu), Virginia Tech, Blacksburg, VA 24061, and **Jeff Borggaard** and **Serkan Gugercin**. *Comparison of $\mathcal{H}_2$- and Proper Orthogonal Decomposition-based Compensators in LQG and MinMax Control Designs.*

Low order controllers are essential for the design of real-time feedback controllers for systems described by partial differential equations (PDEs). We consider MinMax control designs that do not require full state information by using a state estimate in the feedback law. In this study we compare two reduced order modeling approaches to obtain low order state estimators for a system described by a nonlinear PDE. In the first case we investigate an $\mathcal{H}_2$-model reduction technique for linear systems. In particular, we implement the iterative rational Krylov algorithm (IRKA) to construct a low dimensional linear state estimator. This method maintains the stability properties of the original system. In the second case we construct a nonlinear compensator by including the nonlinear terms of the state equation in the differential equation for the compensator. Proper orthogonal decomposition (POD) is then used to determine a reduced order model for the resulting nonlinear equation. We apply these approaches to Burgers equation with periodic boundary conditions. This numerical study compares several different strategies for selecting the inputs to the linearized system, different sizes of the reduced-order models, and different feedback control objectives. (Received September 15, 2014)