Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Resistive Wall Mode feedback on DIII-D using Linear Quadratic Gaussian control and a GPU powered control system[1] M.D. CLEMENT, UCSD, G.A. NAVRATIL, J.M. HANSON, J. BIALEK, Columbia U., D.A. PIGLOWSKI, B.G. PENAFLOR, GA — A Graphics Processing Unit (GPU) based control system has been installed on the DIII-D tokamak for Resistive Wall Mode (RWM) control similar to one implemented at the HBT-EP tokamak [1]. DIII-D can excite RWMs, which are strong, locked or nearly locked kink modes whose rotation frequencies do not evolve quickly and are slow compared to their growth rates. Simulations have predicted that modern control techniques like Linear Quadratic Gaussian (LQG) control will perform better than classical control techniques when using control coils external to the vacuum vessel. An LQG control algorithm based on the VALEN model for the RWM [2] has been developed and tested on this system. Early tests have shown the algorithm is able to track and suppress with external control coils the plasma response of an n=1 perturbation driven by internal control coils. An overview of the control hardware, VALEN model, control algorithm and initial results will be presented.

[1] Rath, Nikolaus 2013, Plasma Phys. Control. Fusion, **55**, 084003
[2] Bialek, James 2001, Physics of Plasmas, **8**, 2170

[1]Supported by the US DOE under DE-FG02-04ER54761 and DE-FC02-04ER54698.

M.D. Clement
UCSD

Date submitted: 21 Jul 2015 Electronic form version 1.4