Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Actuator Management via Nonlinear Real-time Optimization[1]
ANDRES PAJARES, EUGENIO SCHUSTER, Lehigh University, MICHAEL WALKER, DAVID HUMPHREYS, General Atomics, GENERAL ATOMICS TEAM — An actuator management algorithm based on nonlinear, real-time optimization techniques has been designed, tested in simulations, and is currently being implemented within the DIII-D Plasma Control System (PCS). Tokamaks are highly complex devices in which a multitude of control tasks must be carried out by many shared actuators. This motivates the development of actuator management algorithms within present and future PCS designs. The primary goal of an actuator manager is to calculate in real time actuator requests that can fulfill as many control objectives as possible despite physical saturation limits and potential actuator failures. In this work, an actuator management algorithm has been designed based on an Augmented Lagrangian optimization method. Different control objectives can be embedded in this scheme both as terms within a cost function that needs to be minimized (e.g., control effort) and as constraints (e.g., absolute or rate limits for power, torque, etc.). Its performance has been tested in DIII-D simulations using the Control-Oriented Transport Simulator (COTSIM). Moreover, it is currently being implemented within the DIII-D PCS as a further step towards developing a higher level of integration for the present architecture.

[1]Work supported by US DOE under DE-SC0010661 and DE-FC02-04ER54698

Andres Pajares
Lehigh Univ

Date submitted: 08 Jul 2020 Electronic form version 1.4