Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Self-consistent and robust estimation of the MHD equilibrium suitable for control oriented models of the q-profile evolution[1] P. GARCIA-MARTINEZ, CONICET - Centro Atomico Bariloche, P. MONTES, Instituto Balseiro, E. SCHUSTER, Lehigh University — The feasibility of controlling the q-profile using closed-loop controllers designed from first-principles-driven control-oriented models has been demonstrated in tokamaks like DIII-D. These control-oriented models typically use the magnetic diffusion equation for the poloidal magnetic flux profile evolution, combined with simplified models for other plasma quantities such as the electron density, the electron temperature, and the noninductive current-drives. The magnetic diffusion equation is expressed in flux coordinates thus requiring several geometric profiles that depend on the underlying MHD equilibrium of the plasma. In this work, a self-consistent method to improve the estimation of the MHD equilibrium and the required geometric profiles is proposed. The method combines a two-dimensional linear model, that takes into account the geometry of the flux surfaces, with a one-dimensional non-linear model that incorporates the evolution of the magnetic profiles resulting in a robust and fast strategy for MHD equilibrium estimation.

[1]Supported by the US DOE under DE-SC0010537, DE-SC0010661, and the Fulbright-CONICET scholar program.

Pablo Garcia-Martinez
CONICET - Centro Atomico Bariloche

Date submitted: 14 Jul 2017 Electronic form version 1.4