Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Inclusion of predictive modeling in NTM control algorithms towards advanced integrated control of long-pulse tokamaks M. KONG, O. SAUTER, F. FELICI, C. GALPERTI, A. TEPLUKHINA, T. VU, EPFL-SPC, Switzerland, T.C. BLANKEN, TU/e, Netherlands, O. KUDLACEK, M. MARASCHEK, E. POLI, M. REICH, W. TREUTTERER, IPP, Germany, THE TCV TEAM TEAM[1], THE EUROFUSION MST1 TEAM TEAM[2] — Present-day experiments on neoclassical tearing mode (NTM) control have shown that, if sufficient electron cyclotron current drive can be positioned on the target rational surface, NTMs can be stabilized or preempted. However, in future devices like ITER, it is necessary to carry out NTM control tasks simultaneously with other tasks, sharing a limited set of actuators. For this purpose it is advantageous to have a real-time (RT) module that is able to compute the amount of power required to stabilize or preempt an NTM in RT, facilitating actuator allocations. The RT prediction of NTM width and frequency will contribute to disruption prediction and avoidance tasks that are essential for devices like ITER. We will present the first example of such predictive capabilities in the NTM control algorithms for TCV and ASDEX Upgrade, based on RT-capable evaluation of the Modified Rutherford Equation (MRE). The proposed RT-MRE module is tested with extensive simulations in preparation of its experimental applications. Relevant results and the implications for the overall integrated control strategy will be discussed.

[1]See author list of S. Coda et al., 2019 Nucl. Fusion accepted (https://doi.org/10.1088/1741-4326/ab25cb)
[2]See the author list of H. Meyer et al., 2017 Nucl. Fusion 57 102014

Mengdi Kong
EPFL-SPC, Switzerland

Date submitted: 02 Jul 2019 Electronic form version 1.4