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Numerical optimization of the ramp-down phase with the RAPTOR code ANNA TEPLUKHINA, OLIVIER SAUTER, Ecole Polytechnique Federale de Lausanne (EPFL), Swiss Plasma Center (SPC), CH-1015 Lausanne, Switzerland, FEDERICO FELICI, Eindhoven University of Technology, POBox 513, 5600MB Eindhoven, The Netherlands, THE TCV TEAM[1], THE ASDEX-UPGRADE TEAM[2], THE EUROFUSION MST1 TEAM[3] — The ramp-down optimization goal in this work is defined as the fastest possible decrease of a plasma current while avoiding any disruptions caused by reaching physical or technical limits. Numerical simulations and preliminary experiments on TCV and AUG have shown that a fast decrease of plasma elongation and an adequate timing of the H-L transition during current ramp-down can help to avoid reaching high values of the plasma internal inductance. The RAPTOR code (F. Felici et al, 2012 PPCF 54; F. Felici, 2011 EPFL PhD thesis), developed for real-time plasma control, has been used for an optimization problem solving. Recently the transport model has been extended to include the ion temperature and electron density transport equations in addition to the electron temperature and current density transport equations, increasing the physical applications of the code. The gradient-based models for the transport coefficients (O. Sauter et al, 2014 PPCF 21; D. Kim et al, 2016 PPCF 58) have been implemented to RAPTOR and tested during this work. Simulations of the AUG and TCV entire plasma discharges will be presented.

[1]See the author list of S. Coda et al, Nucl. Fusion 57 2017 102011
[2]See the author list of A. Kallenbach et al, Nucl. Fusion 57 2017 102015
[3]See the author list of H. Meyer et al, Nucl. Fusion 57 2017 102014

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