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TH/P4-10: Integrated Fusion Simulations of Core-Edge-Wall Thermal and Particle Transport Using the FACETS Code

Wednesday 10 October 2012 14:00 (4h 45m)

We present integrated fusion simulations that couple the core-edge-wall transport into a self-consistent advance for the state of the plasma on transport time-scales. We accomplish this using the Framework Application for Core Edge Transport Simulation (FACETS), a recently developed parallel fusion simulation package incorporating the best models for each region of the tokamak. An overview of the FACETS framework and available components will be presented. We then present coupled simulation results from selected DIII-D discharges. In particular, we focus on the evolution of coupled particle and thermal transport using the TGLF model for computing core transport fluxes. Edge cross-field fluxes are interpreted from experimental data. Measured toroidal rotation profiles are used, coupled to neoclassical estimates of the poloidal flow, to provide the radial electric field needed in sheer flow suppression of transport. In addition the evolution of the plasma current is also taken into account. This allows for the formation of a transport barrier that is is incorporated in the core region. WallPSI modelling is used to provide boundary conditions on the wall-facing boundary of UEDGE. Another focus of this work will be to study the effect of neutral fuelling of the edge. In an experimental discharge neutrals are introduced due to wall recycling and also from gas-puffs. The effect of these sources on the development of the edge pedestal is studied using coupled simulations.

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