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Optimising the ITER 15MA DT Baseline Scenario by Exploiting a Self-Consistent Free-Boundary Core-edge-SOL Workflow in IMAS

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The ability to describe the essential physics and technology elements needed to robustly simulate the operation of ITER is critical to being able to model the plasma scenarios that will run in ITER.
The Integrated Modelling & Analysis Suite (IMAS) is used to simulate the 15 MA DT baseline scenario operation, including a description of the plasma evolution from its core up to the plasma facing components respecting the principal engineering limitations of the poloidal field coil system.
The free boundary equilibrium code DINA has been combined with the JINTRAC suite of codes exploiting their full core+edge+SOL+MHD modelling capabilities in an IMAS workflow in open loop coupling. For the first time, the 15 MA / 5.3 T DT ITER baseline scenario has been assessed for the entire evolution from the early ramp-up phase (from X-point formation) until the late ramp-down phase (X-point to limiter transition) by means of integrated simulations with consideration of core+edge+SOL transport model assumptions recently validated at JET with time-dependent free boundary plasma geometry and with the pedestal pressure being determined by continuous self-consistent edge MHD stability analysis.
The paper will describe the new IMAS modelling workflow for the fast execution of highly integrated DINA+JINTRAC simulations as well as the results of the ITER 15 MA DT baseline scenario optimisation study. Conclusions will be drawn regarding the available operational space and control capabilities as well as observed differences with respect to results obtained in previous modelling studies with less sophisticated workflows and a reduced level of integration.

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