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P4.034 Modeling of ITER initiation scenarios using IMAS framework

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A careful control of poloidal field (PF) coil currents is indispensable to assure a successful plasma initiation in ITER. This requires the development of an accurate modeling tool which can evaluate PF coil current and voltage waveforms leading to a satisfactory breakdown condition. In particular, it is of most importance to provide the necessary loop voltage with a sufficiently large field null in the presence of a large amount of eddy current anticipated in ITER plasma initiation. In this study, we develop an ITER plasma initiation scenario by using a two-dimensional ITER conductor model. The realistic power supply constraints such as the maximum voltage and current are taken into account. The constraints for flux and fields are imposed by using a constrained least square method. We evaluate various scenarios and provide an optimal initiation scenario, satisfying all the constraints imposed to obtain a successful breakdown. In addition to this, we identify the most vulnerable point in terms of inductive heating for each PF coil. This information will be of importance for a thermos-hydraulic analysis of ITER PF coils. The simulation code is developed using the ITER Integrated Modeling Analysis Suite (IMAS) data structure for an easy adaptation to the integrated ITER simulator.

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