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Development of ITER Non-Activation Phase Operation Scenarios

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Non-activation phase H/He operations in ITER will be important for commissioning of tokamak systems, such as diagnostics, heating and current drive (HCD) systems, coils and plasma control systems, and for validation of techniques necessary for establishing feasible operations. The assessment of feasible HCD schemes at various toroidal fields (2.65-5.3T) has revealed that the previously applied assumptions need to be refined for the ITER non-active phase H/He operations. A study on the ranges of plasma density and profile shape using the JINTRAC suite of codes has indicated that the hydrogen pellet fueling system should be carefully utilized in He operation to optimize IC power absorption, neutral beam shine-through density limit and H-mode access. The EPED estimation of the edge pedestal parameters has been extended to various H operation conditions, and the combined EPED and SOLPS estimation has provided a good guidance for modelling the edge pedestal in H/He operations. The availability of ITER HCD schemes, ranges of achievable plasma density and profile shape, and estimation of the edge pedestal parameters for H/He plasmas have been combined with the previous modelling efforts on studying the H-mode access and flat-top duration within the coil system constraints. Feasible ITER non-activation phase H/He operation scenarios have been developed by performing integrated time-dependent tokamak discharge simulations using CORSICA.

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