Combined DINA-CH and CRONOS Simulation of TCV plasma

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The tokamak discharge simulator which is consists of DINA-CH and CRONOS can simulate free-boundary tokamak plasma evolution with advanced core transport modelling [1]. Simulation of one of the TCV plasmas would be a good verification example of this tokamak discharge simulator which has been optimized for the simulation of ITER plasmas in the flat-top phase. A TCV discharge showing a particular free-boundary feature is the best choice for this type of simulation which has a unique capability of investigating free-boundary effects coupled to the plasma transports. Therefore, a TCV discharge in which temporal oscillations of total plasma current and electron temperature have been observed during the evolution of electron internal transport barrier (eITB) is chosen to be simulated. In this discharge, the eITB has been formed in the application of off-axis co-ECCD and sustained by non-inductively driven currents for many current redistribution times [2]. Recent research shows that the temporal oscillations of total plasma current and electron temperature are related mainly to an MHD mode existing during ECCD phase [3]. However, the contribution of free-boundary effects such as radial plasma movements followed by the total plasma current oscillation still needs to be investigated. The simulation results and the expanded capabilities of the combined DINA-CH and CRONOS simulator will be presented.

References

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