PRELIMINARY RESULTS OF DIVERTOR MODELING FOR DEMO-FNS REACTOR

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The DEMO-TIN fusion-fission project [1] is under development in Kurchatov Institute, in collaboration with other organizations. This machine employs the fusion plasma as a neutron source for the fission reactions in the nuclear blanket material. Such a reactor is essentially sub-critical and this improves significantly its operation safety. The hard spectrum of the fusion neutrons ensures high efficiency of the fission reactions in the blanket and allows breeding the nuclear fuel or transmuting the fission reactor waste.

The fusion core of DEMO-TIN is a tokamak with the major radius of 3.2 m and fusion power about 40 MW [2]. One of the principal issues in long pulse operation of such a machine is arranging properly the edge plasma that ensures removal of the power released in the plasma, removal of the reaction products and control of the plasma density. In DEMO-TIN, this is realized with a double-null poloidal divertor [3] operating in the detachment mode – that is, with the plasma effectively detached from the targets [4]. The first results of modeling the DEMO-TIN divertor with the SOLPS4.3 code package [5] are discussed in the present paper. The effect of the divertor geometry on the detachment, the pumping efficiency and the edge plasma density (the latter forms the requirements to the power losses from the divertors, which are controlled by seeding the plasma with additional impurities). In particular, maintaining the plasma density at the plasma edge at the level below (4–5) × 1019 m−3 is shown to require some 70% power leaving the core plasma across the separatrix being radiated on impurities in the edge plasma.

**References**

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