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P5.1089 Simulations of blob dynamics in the edge of tokamak T-15

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Turbulent dynamics of tokamak edge plasma related to convective motion of filamentary structures, or blobs, plays an important role in determining the heat and particle fluxes coming from core plasma to the first wall of the machine [1]. Combined with the problem of plasmasurface interaction and tritium retention in the plasma facing components of a tokamak, this makes prediction of the areas of preferential contact between blobs and the tokamak first wall a highly important issue.
Computer simulations of blob dynamics in turbulent codes, such as HESEL, GBS, BOUT++, TOKAM3X and others [1, 2], are widely used in theoretical studies of blob dynamics nowadays. In these works, it is frequently assumed that blobs propagate in background plasma with either homogeneous or inhomogeneous model profiles. In tokamaks, however, the edge plasma parameters can have intricate profiles both across and along the magnetic field lines, which has to have impact on dynamics of filaments in the edge of these machines.
In this contribution, we numerically investigate dynamics of blobs in the edge of the T-15 tokamak, presently constructed at the National Research Center "Kurchatov Institute". For simulations, we employ the code written in the BOUT++ framework [3], taking into account the realistic magnetic geometry of the tokamak and the spatial distributions of the edge plasma profiles obtained by using the 2D transport code SOLPS4.3. Specific routines that allow interpolating data between the BOUT++ and SOLPS computational grids and to pre/post-process them are developed. For the analysis of filament dynamics, two distinct scenarios of T-15 operation with low and high edge plasma densities are chosen. The first modeling results of blob motion in the edge of the T-15 tokamak in these operational regimes are demonstrated and discussed.

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