MHD Simulation of Physical Processes in Spherical Plasma-Focus Chambers with Allowance for Neutron Generation [[1]](#footnote-1)\*)

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The results of the development of a two-dimensional MHD code for carrying out computational studies of the dynamics of plasma current sheath in spherical chambers with a plasma focus are presented. Equations of magnetohydrodynamics with allowance for magnetic field diffusion, thermal conductivity and plasma radiation are used in this work. An implicit scheme is used in the calculation of the magnetic field, which makes it possible to describe the motion of plasma in a low-density region behind the plasma sheath. The formulas that take into account the possible appearance of anomalous resistance in the plasma are used to calculate the plasma conductivity. The neutron yield is calculated with allowance for thermonuclear and beam-target neutron generation mechanisms [1]. The effect of the minimum residual gas density behind the plasma sheath on the cumulation of the plasma sheath is studied. The effects of magnetic field diffusion, thermal conductivity and anomalous plasma resistance on the plasma sheath dynamics are considered. The calculations are performed for two spherical plasma-focus chambers [2,3] operating with currents up to 1 and 2 MA and neutron yields to 1012 and 1.5 × 1013 DT neutrons, respectively. The comparison of the calculated dependences with experimental data on the current, voltage and neutron yield made it possible to refine the parameters used in the calculations and achieve a satisfactory agreement between the simulation and experiment.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/It/ru/DK-Dolinskii.docx) [↑](#footnote-ref-1)