mathematical SUPPORT of experiments on the ktm tokamak

Zotov I.V., Sychugov D.Yu., 1Dokuka V.N., 1Khayrutdinov R.R., 2Sadykov A.D.

Faculty of Computational Mathematics and Cybernetics, Lomonosov Moscow State
 University, 119991 Moscow, Russia, iv-zotov@cs.msu.ru
1National Research Centre “Kurchatov Institute”, 123182 Moscow, Russia
2Institute of Atomic Energy of NNC RK, 071100 Kurchatov, Kazahstan

Nowadays, the KTM tokamak installation is in the process of preparing it for physical launch. Concerning this, the task of finalizing the planned discharge scenarios becomes urgent. At the moment, the availability of a large number of highly developed numerical codes introduced independently by different groups of researchers makes it possible to carry out not only a detailed study of the entire scenario, but also to verify the results, which will undoubtedly increase the reliability of modeling. This report presents the results of a comparison of the basic discharge scenario in the KTM facility, which was independently calculated using the numerical codes DINA, TOKSCEN and RPB [1-5]. The results of calculations of equilibrium, stability, evolution and transport of plasma, as well as the system of magnetic diagnostics of the plasma cord performance [6-7] were compared. The input data for the calculations corresponded to the real design of the KTM facility and were characterized by a high degree of detail. The comparison was made for all the time stages of the discharge, beginning approximately with the breakdown: the initial stage, the current rise stage, the formation of the separatrix, the stage of access to quasi-stationary and the discharge attenuation stage. The high level of compliance at any stage of discharge between the results of calculations carried out with different codes allows confirming the realism of the scenarios included in the experimental program of the KTM tokamak.

This work was carried out with the support from the RFBR (grants No. 17-07-00544-a, 17-07-00883-a).

References

1. Sadykov A.D., Sychugov D.Yu., Shapovalov G.V., Chektybaev B.Zh., Skakov M.K. and Gasilov N.A. 2015 [*Nuclear Fusion*](http://iopscience.iop.org/0029-5515/), [**55**,](http://iopscience.iop.org/0029-5515/55) N. 4, 55043017.
2. Belov A.G., Zotov I.V., Sychugov D.Yu. 2012 SCET2012 - Spring World Congress on Engineering and Technology (Xi’an, China, 2012), pp 278-280 (<http://www.scirp.org>).
3. Zotov I.V., Belov A.G. 2014 Problems of Atomic Science and Technology. Ser. Thermonuclear Fusion, 37, No. 1, pp.97-102.
4. Khayrutdinov R.R., Lukash V.E. 2010 Problems of Atomic Science and Technology. Ser. Thermonuclear Fusion, 33, No. 3, pp.50-54.
5. Sadykov A.D., Shapovalov G.V., Chectybaev B., Sychugov D.Yu., Gasilov N.A. 2013 Problems of Atomic Science and Technology. Ser. Thermonuclear Fusion, 36, No. 4, pp.94-101.
6. Belov A.G., Zotov I.V., Sychugov D.Yu., Shapovalov G.V., Sadykov A.D., Chektybaev B.Zh. // 39 EPS/ICPP conference on Plasma Physics, Stockholm, Sweden, 2012. P5.053.
7. Sadykov A.D., Shapovalov G.V., Chectybaev B., Sychugov D.Yu., Gasilov N.A. 2012 Problems of Atomic Science and Technology. Ser. Thermonuclear Fusion, 35, No. 4, pp.90-94.