IMPLEMENTATION of a single software ENVIROnment  
 for numerical experimental support  
 on tokamak instalations

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At present, a vast amount of mathematical methods, software and various information approaches have been accumulated within the framework of Controlled Fusion research programs. Numerical codes that simulate the most important processes in plasma are created and successfully used. The most important task nowadays is to integrate them into a single software environment aimed to design the Tokamak installations and the accompaniment of experiments on them.

The creation of such an environment implies the development of software that is equally convenient for specialists of different profile: calculators, experimenters, engineers. The development of such software includes the construction of developed informational and computational portals that allow using locally stored numerical codes and simulation systems remotely via a standard Web-browser. Recently developed Web-programming systems, Internet technologies and new computer protocols provide the necessary basic tools for creating such informational and computational portals.

Today, a new open access computing resource nfusion.cs.msu.ru has been developed, it includes modules for calculating equilibrium, vertical stability, evolution and transport of plasma, as well as simulation systems for magnetic plasma diagnostics [1-5]. These modules are integrated into a single software environment that allows complex simulation of experiments on tokamak installations. The resource allows you to access the calculation modules stored on the server via the Internet, to exchange data between the modules, as well as to output the results of calculations in the form of files, pictures, graphs and tables. An important advantage of the resource is its ability to support simultaneously several users located in different places. The resource also has an information support system that allows working in two languages (Russian, English).

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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.