APPLICATION OF DEEP LEARNING FOR DATA PROCESSING OF THOMSON SCATTERING DIAGNOSTICS [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2021.48.1.061

Kurskiev G.S.

Ioffe Institute, Saint Petersburg, Russia, [gleb.kurskiev@gmail.com](mailto:gleb.kurskiev@gmail.com)

Diagnostics of Thomson scattering of laser radiation is a reliable method for measuring local values of electron temperature and density in the plasma of tokamaks and stellarators. For the registration of scattered signals in systems that utilizes filter polychromators, an approach that assumes recording a detailed temporal waveform of scatter signals becomes more and more popular[1]. This method has a number of advantages, the main ones of which are the convenience of setting up and debugging the system, the ability to separate the signals of stray radiation and the useful scattering signal from the plasma, and the identification of the nature of the observed signal (scattering by dust particles, em disturbances). The possibility of using various algorithms for processing recorded time waveforms allows optimizing the accuracy of determining the number of registered photoelectrons and making a reliable assessment of the measurement error [2] [3]. With such an implementation of the system, a large database is formed: diagnostics having 10 spatial points will form about 18000 pages containing 1024-time samples per 1 second. That’s why creating robust data processing methods are required.

The report discusses the possibility of calculating the intensity of Thomson scattering signals and estimating their error using a neural network trained on a synthetic data. A comparison of the accuracy with traditional processing methods is given, as well as a comparison of the temperature values obtained by different methods in a plasma experiment on the Globus-M2 tokamak.

This work was carried out with the financial support of the Russian Science Foundation (project No. 17-72-20076).

References

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