

A data cleaning and feedback conditioning of J-TEXT ECEI signals based on machine learning

Z.C. Zhang¹, Z. J. Yang,^{1,*} Y. Gao,¹ X. Q. Zha,¹ C. P. Fu¹

¹*School of Electrical and Electronic Engineering, Huazhong University of Science and
Technology, Wuhan, 430074, China*

E-mail : 2301376856@qq.com

At present, electron cyclotron radiation imaging (ECEI) system with the full digital control has been developed on J-TEXT, which provides an important two-dimensional diagnostic tool for the study of high temperature plasma physics. As many imaging diagnostics/tools, bad signal channels/pixels get make the quality of imaging picture getting worse. To automatically identify and classify the ECEI abnormal signals, a machine learning tool by support vector machine method has been developed. Based on the digital control function of J-TEXT ECEI, it also can correct the channels of supersaturated signals and weak signals by adjusting the attenuation levels. At present, the system has been set up, and the overall accuracy of the classification algorithm in the sample test set can reach 99.61%, the average recognition time is 164s, which can meet the requirements of signals identification and feedback adjustment between two discharging shots. For subsequent physical analysis, it provides a more accurate data and the signals are labeled to facilitate subsequent handling.

Keywords: Electron cyclotron radiation diagnosis, ECEI signal, machine learning, data cleaning, feedback regulation

References

- [1] X.L Xie, Establishment of the Electron Cyclotron Emission Imaging Diagnostic on J-TEXT Tokamak: [D] . Wuhan. HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY LIBRARY, 2020
- [2] Z.J. Yang, Development of intelligent control module for the J-TEXT Electron Cyclotron Emission Imaging system, Fusion Engineering and Design, 153 (2020) 111494
- [3] C. Li, An automatic data cleaning procedure for electron cyclotron emission imaging on EAST tokamak using machine learning algorithm, Journal of Instrumentation, 13 (2018) P10029