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相互相關型電子サイクロトロン放射ラジオメーターの開発と
LHDプラズマにおける乱流観測

Development of Correlation Electron Cyclotron Emission Radiometer and measuring turbulence of LHD plasma

東哲矢、近木祐一郎、徳澤季彦、田村直樹、長山好夫、土屋隼人、
桑原大介、間瀬淳、川端一男

Tetsuya Higashi¹, Yuichiro Kogi¹, Hidehiko Tokuzawa², Naoki Tamura², Yosio Nagayama²,
Hayato Tsuchiya², Daisuke Kuwahara², Atsushi Mase³, Kazuo Kawahata²

¹福岡工業大学、²核融合科学研究所、³九州大学

¹Department of Information, Fukuoka Institute of Technology, Kukuoka, Japan,
Mam13006@bene.fit.ac.jp, kogi@fit.ac.jp

²National Institute for Fusion Science, Toki, Gifu, Japan

tokuzawa@nifs.ac.jp, ntamura@lhd.nifs.ac.jp, nagayama@nifs.ac.jp,
tsuchiya.hayato@lhd.nifs.ac.jp, kuwahara.daisuke@ms.nifs.ac.jp, kawahata@nifs.ac.jp

³Art, Science and Technology Center for Cooperative Tesearch, Kyusyu University, Kasuga,
Kukuoka, Japan
mase@astec.kyushu-u.ac.jp

Aim of study, is measarement of plasma turbulence using Electron Cyclotron Emission (ECE) measurement. ECE measurements have a spatial resolution and high time resolution. But since the anplitude of the ECE signal is determined by the stochastic process of the emission, noise is included in ECE signal. Because turbulent signal is very weak, turbulent signal is buried in the stochastic noise. Therefore, using a correlation analysis is necessary to divide the noise component turbulence component from the noise.

This system is attached to ECE measuring instruments called RADH. RADH, receives the ECE (RF 105.5-196GHz) signal emitted from LHD plasma by the waveguide end aperture, and measures the electron temperature distribution. Firstly, ECE signal is divided into 2signals. One is for higher frequency signal (RADH-H134-196GHz), and the another is lower frequency band RADH-L (105.5-130GHz). The Correlation electron cyclotron emission radiometer (cECE) system uses frequency down converted signal (2-26.5GHz) from the RADH-L. cECE, and sown converts each signals to low frequency (<100MHz) with specific LO frequency. LO frequency is individually controlled to change measurement position. By using multichannel signals, it is possible to perform correlation analysis. The previous experimental system have 16ch

channels, and hare the measurement bandwidth of 200MHz. However correlation between channels has not been observed. Because, electron fluctuations has a very small amplitude compared to the system noise, that is, S / N ratio was bad. We have improved the cECE system. Number of the channel is four, and Bandwidth is 50MHz to improve the S/N ratio and localization of the signal.

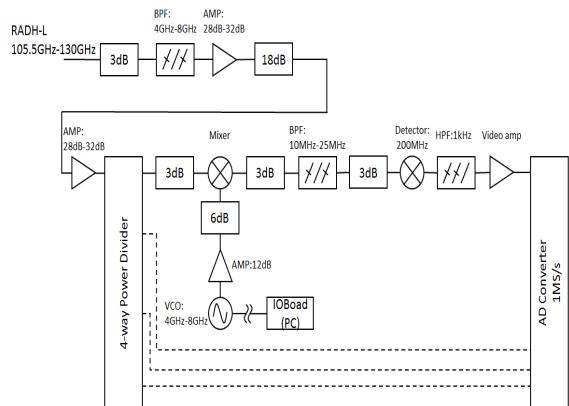


Figure1. cECE system