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Extension of HF radio observation system in Fukui University of Technology through the introduction of GnuRadio

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In Fukui University of Technology, radio observations in HF band (20-40MHz) have been carried out from 2000 for Jovian decameter radiation and Solar radio bursts. At the observation site which is located at Awara campus (N36deg., E136deg.), 3 antenna towers height of 20m was set up and 9-elements cross log-periodic antenna was mounted at the top of each tower. The observation system has worked as 3 short baseline interferometer system with a baseline length of 100m class.

In Fukui University of Technology, ”Formation of research centers involved in the measurement and conservation of the environment in Hokuriku region” project has been started from 2011 with the support of MEXT. In the project, we are planning to take advantage of the radio observation system in Awara campus for observation and monitoring of lightning or thunder storm activity. Therefore, we are currently developing a high-performance receiving system by introducing software-defined radio (SDR) GnuRadio+UHD into our observation system in order to realize wideband waveform observation.

GnuRadio+UHD is an open software package which is consists of a lot of signal processing blocks written by C++. A user can produce one’s own receiving system by combining of a user-made program using the signal processing blocks and a digital receiver. Currently, we are investigating the performance of GnuRadio+UHD with USRP2 (Universal Software-defined Radio Peripheral) supplied by Ettus Research Co. Ltd. as a digital receiver. As the result of performance test carried out so far, it has been clarified that this system has characteristics of (i) wideband (1-250MHz), (ii) high sampling rate (25MHz), (iii) wide dynamic range (90dB) and (iv) high phase stability. We conclude that this SDR system has a good performance as a receiver for interferometer system and are scheduled to advance the development of new observing system by using GnuRadio+UHD.

Keywords: software-defined radio, GnuRadio, USRP, radio observation