

Multi-channel Microwave Reflectometer for Fluctuation Profile Measurements in LHD

T. Tokuzawa, A. Ejiri^a, K. Kawahata, K. Tanaka, and LHD Experiment Group

National Institute for Fusion Science, 322-6 Oroshi-cho, Toki 509-5292, Japan

^a *Graduate School of Frontier Sciences, The University of Tokyo, Kashiwa 277-8561, Japan*

e-mail address : tokuzawa@nifs.ac.jp

For studying the influence of the instability on the plasma confinement and measuring the internal structure of fluctuation, we have been developing a multi-channel microwave reflectometer system in the Large Helical Device (LHD). The system includes a broadband frequency-tunable source, which has the ability of fast and stable hopping operation. For constructing the multi-channel system, we have tried two types of modulation technique. One is amplitude modulation and another is frequency modulation. In the case of amplitude modulation, a single-sideband (SSB) modulation technique is applied for an accurate heterodyne phase detection system. Recently, high performance SSB modulators are available in the wide band frequency range and its sideband rejection is around -30 dB. Different SSB modulation frequency sources generate each modulated frequency of microwave. In LHD last experimental campaign, two different modulation sources, which make the frequency difference of ~ 0.9 GHz of probing microwave in V-band, was applied and obtained the experimental results of fluctuation amplitude of Alfvén eigenmode. In the case of frequency modulation, one modulation source makes some comb frequency components with a carrier wave. At the conference, we will present the detail of these microwave reflectometer systems and newly obtained experimental results.