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GAMMA10におけるAlfvén ion-cyclotron波動の励起特性
Excitation characteristics of Alfvén ion-cyclotron wave in GAMMA10

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In GAMMA10, which generates a few-% beta plasma with temperature anisotropy of over 10, Alfvén ion-cyclotron (AIC) waves are observed to be spontaneously excited and cause saturation of the temperature anisotropy through pitch angle scattering[1]. The frequencies of the AIC waves excited in the GAMMA10 central cell are in the range of 5.6 MHz – 6.0 MHz, just below 6.36 MHz used for the main ICRF heating, and vary with the change of plasma parameters. While the AIC wave observed in geomagnetism shows broad spectrum peak, the AIC waves observed in the GAMMA10 central cell have sharp discrete peaks in the spectrum. The difference must be arising from some different boundary conditions since the wavelength of an ICRF wave is comparable to the device scale length.

To study the internal structure of the AIC waves and those boundaries, we have upgraded the recently developed reflectometer system[2] to two-point measurement system. This system utilizing two reflectometers can be used for dual purpose by a simple modification of the transmitting line; simultaneous two-point measurement in either axially or radially separated positions. All the output signals of the two reflectometers and a magnetic probe are simultaneously digitized by a fast oscilloscope to be detected in a synchronized manner with 25-MHz sampling.

Density fluctuations at various radial positions and axially separated two positions show that the power distribution among the AIC waves changes much both in radial and axial directions in the earlier period just after the excitation. Importance of the measurement especially in the core region of $r/a < 0.3$ was suggested.

Figure 1 shows an example of the phase difference between the two density fluctuations measured at axially separated positions. The phase differences of the AIC waves show the feature of transformation from propagating (finite phase diff.) to standing waves (0 phase diff.) in the initial excitation period, which was also indicated in the previous study using adjacent magnetic probe sets[3,4]. The time-evolving internal structure of the AIC waves is discussed from these results.

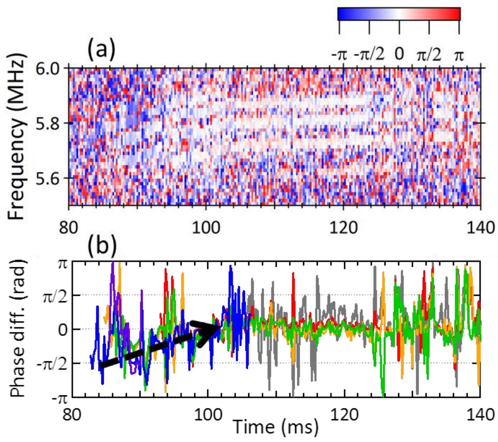

Fig. 1. Time evolution of the phase difference between two density fluctuations measured with the two-channel reflectometer. The axial and radial positions are at z = 112, 137 cm and r/a ~ 0.8, respectively. (a) The intensity plot of the phase difference in the frequency spectrum and (b) the phase differences for peak frequencies.

1. M. Ichimura *et al.*, Phys. Rev. Lett. **70**, 2734 (1993).
2. R. Ikezoe *et al.*, Plasma and Fusion Res. **6**, 2402047 (2011).
3. R. Katsumata *et al.*, Phys. Plasmas **3**, 4489 (1996).
4. M. Nakamura *et al*., Rev. Sci. Instrum. **72**, 394 (2001).