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GAMMA10 東西両アンカー部における ICRF 加熱実験
ICRF Heating Experiments in Both East and West Anchor Cells on GAMMA10

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In the GAMMA10 tandem mirror, waves with ion cyclotron range of frequency (ICRF) have been used for plasma production and heating. Plasma is produced by use of Type-III antennas located in both ends of the central cell. In order to keep MHD stability of main plasma in the central cell, anchor cells, which have minimum-B configuration, are located in the east and west sides of the central cell. In a typical discharge, waves excited by Type-III antennas produce and heat plasmas in the anchor cells. In this study, we have performed direct heating experiments in the anchor cell by using anchor antennas.

Double-Arc Type (DAT) antennas are installed in both east and west anchor cells. In the east anchor cell, DAT antenna is located in the central cell side from the anchor midplane. Then the cyclotron resonance layer exists in the east side of both Type-III and DAT antennas. On the other hand, in the west anchor cell, DAT antenna is located in the west end cell side from the anchor midplane. The cyclotron resonance layer exists between both antennas. Two experiments have been performed. One is the DAT antenna driven with different frequency from Type-III antenna, and the other is the DAT antenna driven with the same frequency. In the same frequency case, the phase difference between both antennas can be controlled.

In both the different and the same frequency cases, the increase of the line density is clearly observed in the anchor and central cells when the DAT antenna is used. In different frequency case, stronger effects are detected in the east anchor heating than in the west anchor heating. Figure1 shows the temporal evolution of line densities in the central and anchor cells (a) in the case of the east anchor heating and (b) in the west anchor heating. Signal of secondary electron detector (SED), which indicate the energy flux emitted from the anchor cells are also shown. In the same frequency case, the direction of the wave propagation is controlled by changing phase difference between Type-III and DAT antennas.[1] When the waves propagate to the cyclotron resonance layers located near the anchor midplane, the increase of the line density in the anchor cell is remarkably observed.

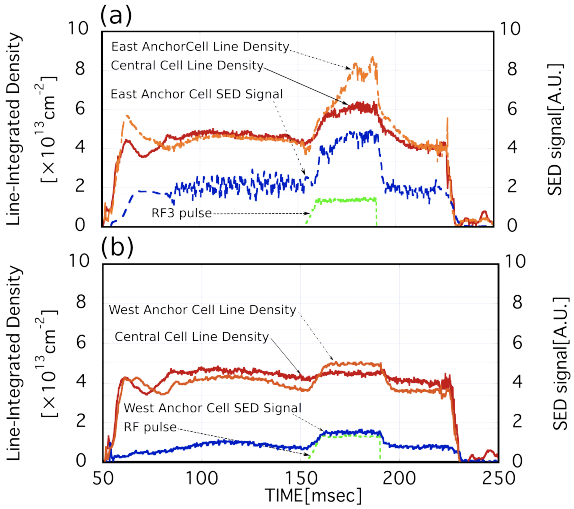

Fig.1 The temporal evolution of line densities and SED signal (a) with use of east DAT antenna (b) with use of west DAT antenna. The shape of RF3 pulse is inserted.

[1] Y.Ugajin et al., 9th Int. Conf. on Open Systems 2012, August 27-31 2012, Tsukuba