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GAMMA 10プラグ/バリア部におけるICRF加熱実験
ICRF heating experiments in the plug/barrier cells on GAMMA 10

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The GAMMA 10 tandem mirror consists of five mirror cells, which are a central cell, two minimum-B anchor cells located in both sides of the central cell, and two plug/barrier cells at both ends. Main plasmas are produced in the central cell and magneto-hydro-dynamics stability is kept with the minimum-B configuration in the anchor cells. Potential for the confinement is created in the plug/barrier cells. Recently, diverter simulation experiment has been performed in the west end region of the device. For the diverter simulation experiment, it is needed to control parameters of end loss particles.

In GAMMA 10, 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 in both ends of central cell. In the anchor cells, Double-Arc Type (DAT) antenna is installed for direct heating in the anchor cells. In a typical discharge, waves are excited by Type-III antennas. DAT antenna is driven with the same frequency as Type-III antennas. Then, direction of the wave propagation is controlled by changing phase difference between both antennas. It becomes possible to heat anchor plasma more efficiency. [1][2]

In this study, heating experiment in west plug/barrier cell has been performed with west DAT antenna in order to control ion temperature and heat flux to the end region. The west DAT antenna is driven with a frequency of 8.0 MHz that is the cyclotron frequency near the midplane of the plug/barrier cell. End Loss Ion Energy Analyzer (ELIEA) is used for measurement in the end region. ELIEA exists in west end of device and detects end loss ions.[3][4] Energy distribution of end loss ions is described by combination of high and low temperature components. Effective $T_{i//}$ is calculated from both temperature components.[5]

Experimental result is shown in Fig.1 and Fig.2. DAT antenna is driven during the hatched period. Figure 1 shows the temporal evolution of end loss ion current. The remarkable increase of ion current is observed during driving DAT antenna. Figure 2 shows the temporal evolution of $T_{i//}$. The increase of high component of $T_{i//}$ is observed and rise of effective $T_{i//}$ is obtained.

From the result of experiment, it is clearly shown that plug/barrier heating with a frequency of 8.0 MHz affect to increasing of $T_{i//}$ of end loss ion. Now, new ICRF antenna has been introduced in the plug/barrier cell. Direct heating experiment in the plug/barrier cell has been performed.

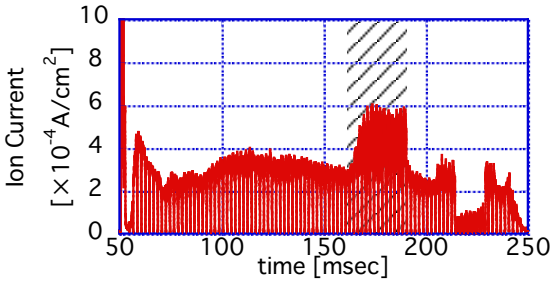

Fig.1 The temporal evolution of ion current.

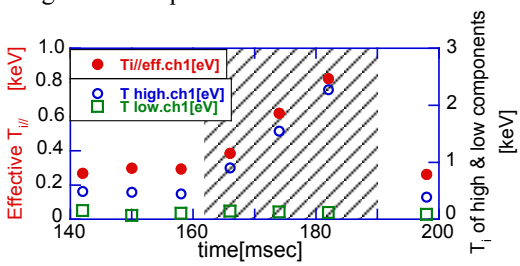

Fig.2 The temporal evolution of effective $T_{i//}$, and $T_{i//}$ high and $T_{i//}$ low components.

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