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GAMMA10における高周波加熱印加時の分割リミターを用いた浮遊電位計測

Measurement of floating potential using segmented limiter during RF heating in GAMMA10

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On the GAMMA10 tandem mirror, plasma is mainly generated and heated by Ion Cyclotron Range of Frequency (ICRF) waves. High temperature and high density plasma is performed with good confinement property. However, non-axisymmetry of plasma parameters and some fluctuations lead to the degradation of the confinement property. Therefore, the azimuthal distribution of floating potentials on a segmented limiter in the central cell are measured to evaluate those non-axisymmetry and fluctuation.

The segmented limiter is set near the midplane of the GAMMA10 central cell. The limiter consists of 8 segments with a diameter of 36 cm. These segments are placed with equal intervals in the azimuthal direction, and are connected to the earth via high resistor. Therefore, 8 floating potentials at the plasma peripheral region are measured at the same time.

For additional plasma heating, several ICRF antennas are installed in the anchor cell. In the case of using the Double Arc Type (DAT) antenna in the west anchor cell with ICRF wave of 8.0 MHz, the relationship between the floating potential and the applied ICRF power was investigated. Figure 1 shows time evolution of diamagnetism as a function of the incident ICRF power. As the input power increases, the diamagnetism drops more largely. Additionally, when the ICRF power is applied at 72 kW, the plasma disappeared, but in the case of ICRF power at 34 kW, 42 kW, and 55 kW, the diamagnetism decreasing is recovered. Figure 2 shows relationship between ICRF injection power and the floating potentials. The floating potentials are increase of the ICRF injection power. However, Dependence of ICRF power on the floating potentials is different for each segment. This result indicates that distribution of the floating potentials in the azimuthal direction is changed by increasing ICRF injection power. Simultaneously, fluctuation on the segmented limiter tend to emerge as the ICRF power increases.

Furthermore, under the various heating conditions, the behavior of plasmas and the floating potential are examined.

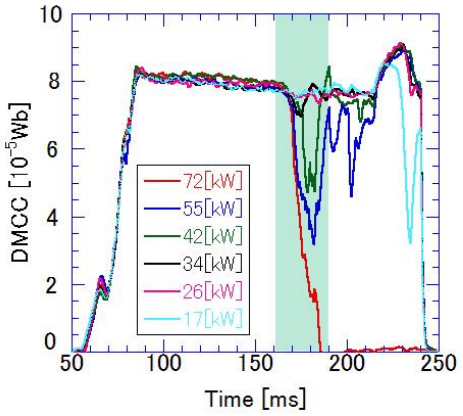

Fig.1. Diamagnetisms in the central cell for discharges using DAT antenna with several ICRF injection power. ICRF is applied from 160 ms to 190 ms.

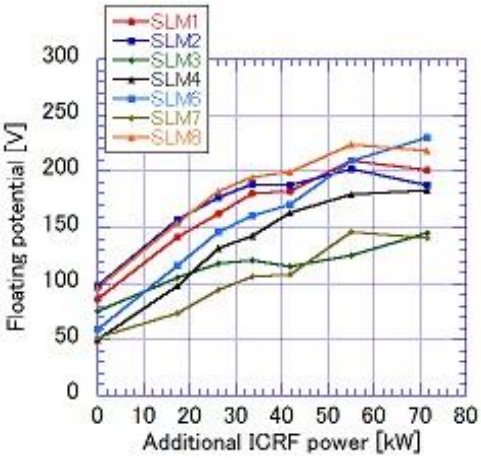

Fig.2. Dependence of ICRF power on the floating potentials. Each floating potential is averaged from 169 ms to 171 ms.