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GAMMA10 ECHアンテナによる吸収位置制御と吸収分布特性実験
Experiment of absorption point control and distribution characteristic by ECH antenna in GAMMA 10

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In the GAMMA 10, Electron Cyclotron Heating (ECH) is utilized for the formation of the plasma confining potentials in plug/barrier cell. The central ECH (c-ECH) is another key to improve plasma performance of the GAMMA 10, since low electron temperature causes the strong electron drug of hot ions in the central cell. To increase the electron temperature of the plasma, it is necessary to inject the strong electron cyclotron waves into the core plasma in the central cell. The c-ECH antenna system has been improved in terms of the transmission efficiency, the control of wave polarization, and radial profile. The transmission efficiency of the present antenna system has achieved 95% in calculation [1,2]. The ray of this antenna system with two mirrors (M_{1a}&M_2) passes through, which are M_{1a} (at the upper port) to M_2 (at the lower port) and M_2 to EC layer. It also enables to inject high purity X-mode wave because of the ray angles of these two paths. Moreover, this system can control the absorption position of the ray (vertically ±7mm on EC layer) by shifting the position of M1a (-12mm≦d≦+12mm). We investigated the dependence of the ECH performance on the M_{1a} position.

Fig.1 shows experimental results of diamagnetism signals in cases of the five M_{1a} positions (d=-12, -6, 0, +6, +12) with 100kW power from 160 to 180ms. It suggests that as injection position goes down, the increase in the diamagnetism (DM) gets larger and the DM decreases in d = +12. In the case of d= -12, Soft X-ray (SX) intensity and potential in central cell increased larger than any other cases, also diamagnetism. In the best heating case, the SX peak position is near the center of the axis (Fig.2). These suggest that the absorption position and power density profile affect the plasma confinement.

In the poster session, we report these experimental results in more detail and discuss about differences and effects of absorption profile. The results of the new broad profile antenna will be also presented.

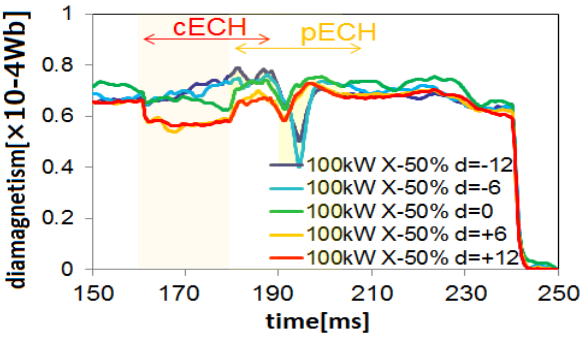

Fig.1 Experimental results of diamagnetism dependence on each injection position d.

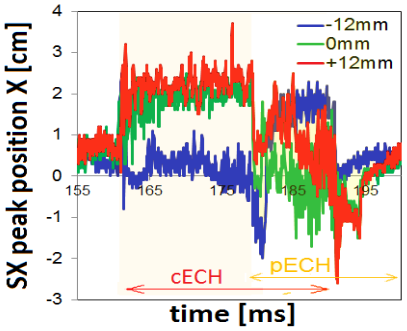

Fig.2 Time evolutions of SX peak position.

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[1]Y.Tatematsu et.al., Jpn.Appl.phys.Tech45 (2006) 7911-7913
[2]Y.Tatematsu et al., Jpn.Appl.phys.Tech44 (2005)6791-6795