

Using the new type antenna which was designed to do the experiment of fast wave current drive and/or electron heating, we could obtained the data of electron heating\(^1\). However the drop of loop voltage is small and then the voltage increases at the beginning of the injection of radio frequency (rf) power as shown in the figure 1(a). The question is that ohmic heating due to rise of the loop voltage may cause the observed electron heating. Then, we compared the behavior of the electron temperature in the case of the fast wave injection with the current ramp up experiment (Fig.1(b)).

Figure 2 shows the time evolution of electron cyclotron emission (ECE) signals in the case of the launching of the fast wave. The plasma center is located around 93cm. As soon as the rf power reaches to the flat top (about 160kW, 207ms), the ECE signals start rising at the plasma core region. At the edge region of plasma, the ECE signals decrease at first and increase gradually afterwards. The rf power deposits in the plasma core region and this result agrees with the prediction using the TASK/W1 full wave code\(^2\).

Figure 3 shows the time evolution of ECE signals in the case of the current ramp up experiment. At the same time as the loop voltage is increased (203ms), the ECE signals are increased particularly at the plasma edge region. The ECE signals from the plasma core region increase slowly compared with those from edge region. The ohmic heating power deposits in the plasma peripheral region at first.

In comparison with the these figures, it is obvious that the observed electron heating is achieved by the fast waves launched into the plasma. It is thought that the rise of the loop voltage is caused by the impurity influx accompanied by the injection of rf power\(^1\).

Fig.1. Time history of plasma current and loop voltage. (a): in the case of fast wave injection. (b): in the case of current ramp up experiment.

Fig.2. Time evolution of ECE signals in the case of fast wave injection. Plasma Center is about 93cm. The position of each chord is indicated in the figure.

Fig.3. Time evolution of ECE signals in the case of current ramp up experiment.

References