§5. Energy Recovery Followed by Improved Confinement

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CHS has two NBIs for tangential injection. They were installed for balanced injection (co and counter directions) in the experiments in Nagoya site. When we restarted CHS experiment in Toki site, we installed two NBIs both in co-injection in order to obtain better heating efficiency simultaneously for two NBIs.

Such an improvement of heating efficiency generally gave a better performance of NBI discharges of CHS in Toki site. Among several modes, here we describe a discharge with an improved confinement with high heating power and a strong gas puffing. Time sequence of discharge is shown in Fig. 1. NBI #2 is applied to a target plasma created by ECH. With a moderate level of gas puffing, the plasma energy increased and the density became about 1-2 × 10^{13}cm^{-3}. At 120 msec, NBI #1 is applied with a strong gas puffing. The additional heating effect is clearly observed with a more than two times larger energy.

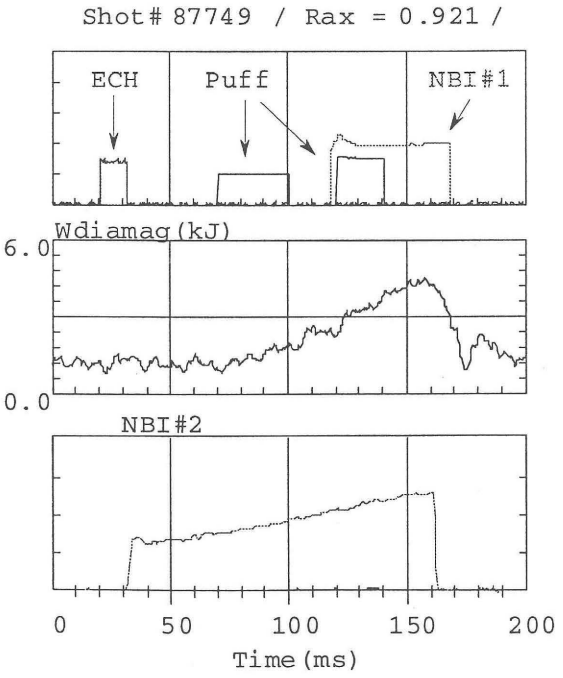

Fig. 1 Time traces of heating and gas puffing for two NBI discharge

When the first gas puffing is increased, the temperature decreased very much because the heating power of NBI #2 is not sufficient to keep the high temperature for increased density. The time sequence of such a case is shown in Fig. 2. However, when NBI #1 is injected with a strong gas puffing, the plasma energy is recovered abruptly and much better energy confinement appears producing larger plasma energy of more than 5 kJ.

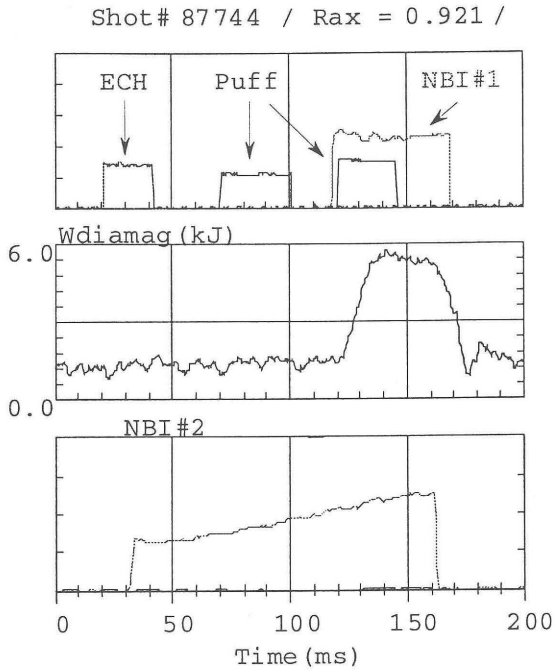

Fig. 2 Time traces of heating and gas puffing for improved confinement discharge

We found already the reheat mode in CHS in Nagoya site which gave an improved confinement after stopping strong gas puffing. In this mode, if the plasma energy drop due to a strong gas puffing before the reheat mode is larger, the improvement became stronger. Similar phenomenon is observed in the present type of discharge, i.e., a larger damage of energy due to a strong gas puff causes better confinement for the succeeding phase of discharge after the recovery of energy. Fig. 3 shows an electron temperature profile of such an improved confinement phase which gives highest value for the middle density range of 3 × 10^{13}cm^{-3}.

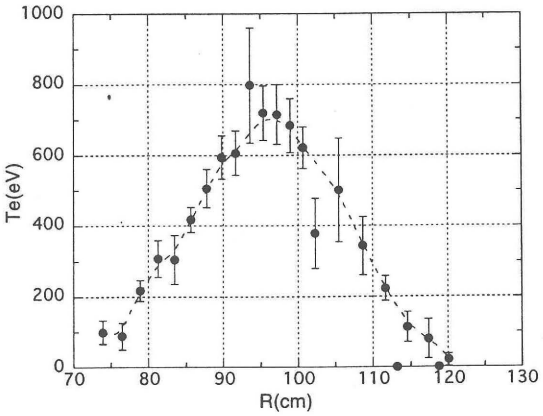

Fig. 3 Electron temperature profile for #87744