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Improved Confinement Mode in the HT-7 Superconducting Tokamak

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Abstract

Improved confinement modes induced by the lower hybrid wave (LHW) heating, the ion Bernstein wave (IBW) heating, the multi-pulse gas puffing and the multifaceted asymmetric radiation from the edge (MARFE) event were studied on the HT-7 superconducting tokamak in this paper. The HT-7 superconducting tokamak [1,2] was reconstructed from the original Russian T-7 tokamak in 1994. The LHCD research on the HT-7 was performed recently [3]. By adjusting plasma and LHW parameters, it was found that the improved confinement mode was achieved in the HT-7 tokamak LHW heating experiments. The plasma particle confinement time increased from 30 ms to 70 ms, and the energy confinement time increased from 4.9 ms to 15.8 ms during improved confinement phase. An experiment of ion Bernstein wave heating was carried out using 30 MHz frequency and 200 kW power in the HT-7 superconducting tokamak [4]. Heating of ions and electrons and the improved confinement was confirmed in the HT-7 tokamak IBW heating experiments. The electron density and the temperature profiles were studied in detail, and the change of the edge fluctuations was observed recently. An improved confinement mode was observed by means of the multi-pulse gas puffing in the HT-7 ohmic discharges, and the interesting results was firstly reported here. An improved confinement mode plasma which was induced by the MARFE event was observed [5,6,7], the global particle confinement time increased 1.9 times. The relaxation time between the MARFE event trigger and the L-H transition is about 1.4 ms, the followed L-H transition time is 1.9 ms, the improved confinement mode phase is maintained for about 40 ms. MARFE cooled the plasma edge, and the electron density profile was observed to become more narrow and peaked.

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