3p54

LHD重水素プラズマ実験におけるITBプラズマの閉じ込め特性
Confinement Characteristics of ITB Plasmas in the LHD Deuterium Experiments

高橋裕己[1,2], 永岡賢一[1,3], 向井清史[1,2], 村上定義[4], 田中謙治[1], 他
H. Takahashi[1,2], K. Nagaoka[1,3], K. Mukai[1,2], S. Murakami[4], K. Tanaka[1], et al.

[1]核融合研, [2]総研大, [3]名古屋大学, [4]京都大学
[1]NIFS, [2]SOKENDAI, [3]Nagoya Univ., [4]Kyoto Univ.

The deuterium operation was initiated in the LHD in 2017 and we successfully extended the high temperature regime in the LHD.

The new record of the ion temperature of 10 keV associated with the ion internal transport barrier (ITB) was achieved due to the upgraded NBI, several operational optimizations such as the wall conditioning, the quantity of the impurity, and the magnetic configuration. In order to achieve higher T_i and to sustain high T_i plasma, the EIC event must be suppressed. The confinement improvement with D also contributed to the increase in the T_i. From the systematic comparison of the transport analyses between the high-purity H and D plasmas with the several magnetic configurations, the effective χ_i was found to be smaller in the D plasmas (FIG. 1). The impurity behaviour of the i-ITB plasmas was found to be different between H and D. The shape of the carbon density (n_C) profile depends on the magnetic configuration for D plasmas. The n_C profile became peaked intrinsically in the inward-shifted configuration and was different from the hollow n_C profile so-called "impurity hole," which has been usually observed in the i-ITB plasmas in the LHD using hydrogen.

With regard to the e-ITB plasmas, almost the same profiles of the electron temperature and the electron pressure between H and D plasma were confirmed in spite of the decreased ECRH power for the D plasma, this was due to the reduction in the χ_e in D plasmas. The GKV simulation showed the linear growth rate of TEM/ITG significantly reduced in the D plasma with e-ITB.

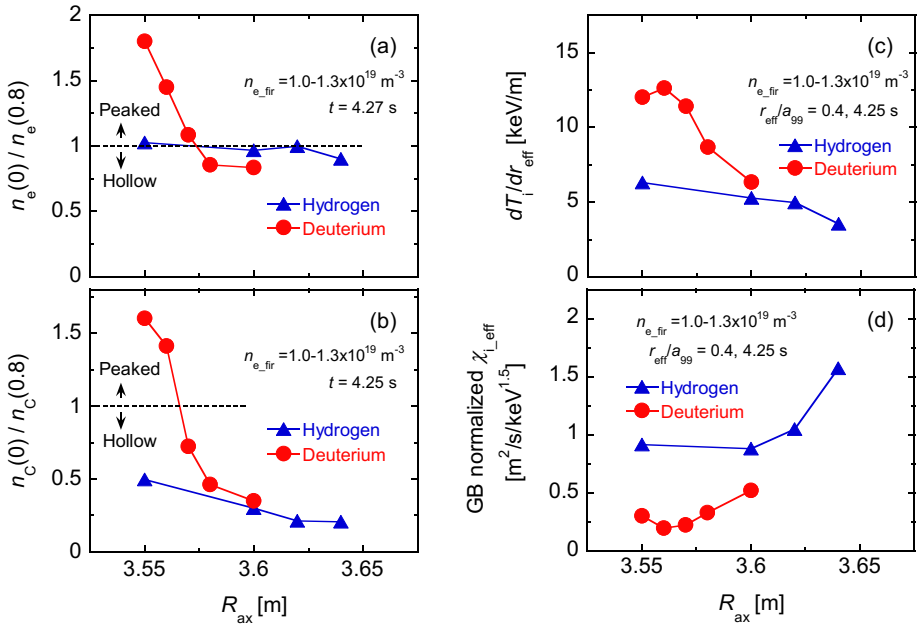

FIG. 1. The configuration dependence of (a) the peaking factor of the n_e profile, (b) the peaking factor of the n_C profile, (c) dT_i/dr_{eff}, and (d) the effective χ_i normalized by the gyro-Bohm factor.