Improved Performance of ECRH by Real-Time Deposition Location Control and Perpendicular Injection in LHD

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Real-time control of the deposition location of ECRH functioned properly to improve heating efficiency at high density

Perp. injection showed better central heating

Higher T_e achieved by perp. injection

Promotion of impurity studies in high n_e ECRH plasma

Summary

- A method of perp. injection was developed in order for the EC wave to be more insensitive to the effect of refection in LHD.
- The Thrust at high n_e. In the case of perp. injection, about 2 keV higher than that in the case of oblique injection for n_e = 4 x 10^{19} m**-3 by 1 MW injection.
- With such improved performance of ECRH, high density ECRH plasma of n_e = 8 x 10^{19} m**-3 was successfully sustained after multiple hydrogen pellet injection.
- This method as well as the real-time deposition location control for efficient impurity absorption in the plasma core region are beneficial not only for preventing damages of in-vessel components during long-pulse operations but also for extending high T operational regimes and precise transport studies.
- Further improvement of ECRH performance up to plasma cutoff is envisaged by perpendicular injection on the vertically-aligned cross section.