4) Influence of stochastisation on barriers / ELM mitigation

Finite beta effect on edge stochasticity and transport properties in LHD

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In the Large Helical Device (LHD), there exists an intrinsic ergodic layer at the periphery of the confinement region, which has been know to play an important roll in the core plasma confinement. In the relatively high beta (low B_t field strength) discharge, the H-mode like phenomena, i.e. the increase of the plasma density and the stored energy with the quick drop of the Hα light, were observed. The ELM like oscillation was also seen in the Hα light signal [1]. Recently similar discharge has also been obtained even in the high B_t operation in the outward shifted configuration [2]. Although it has been known that there exist density window and power threshold for the L-H transition, an essential experimental condition has not been identified yet. However one can easily realize the common feature in two favorable conditions for the H-mode, i.e. high beta and outward shifted configuration. Under these experimental conditions, the edge magnetic structure is more ergodic than that is standard one. Furthermore the edge rotational transform is also changed by the finite beta effect or the magnetic axis shift. Recently the finite beta equilibrium code called HINT has been developed and optimized for LHD. The HINT code is suitable for the edge analysis on LHD since HINT is a fully three dimensional code and can deal with any magnetic field structure, even if it presents ergodic or isolated island structure. In the workshop, the relationship between the L-H transition and the magnetic structure, together with the preliminary results of the numerical analyses with HINT are presented.

[1] Toi K., *et al* 2004 *Nucl. Fusion* **44** 217
[2] Morita S., *et al*., 2004 J. Plasma Fusion Res. **80** 279