Effect of magnetic field structure <u>EX/P3-2</u> on electron internal transport barrier and its role for the barrier formation in Heliotron J

T.Minami, N.Kenmochi, and K.Nagasaki et al. Rational surface (magnetic island)

Heliotron

(1) (2) is formed above ~0.9kA. Threshold 14 2.5 - Ip ~ 0.4 kA 2.5 E Ip ~ 0.9 kA reductio (×e) (×e) (×e) 1.5 ⊢ 1.0 1.2 (0) (keV) 1.0 1.0 0.0 -1.0 1.0 -1.0 0.0 r/a 0.6 r/a - 0.4 0.4 0.8 eITB foot point (r/a) **Temperature** increases 0.3 by eITB formation 0.6 220 240 260 280 P_{ECH}^{Injection}/n_e^{LineAverage} (kW·m³ x10⁻¹⁹) 0.2 **B** region I_{p} (kA) 0.1 expands Threshold (@r/a=0.1) (keV/m) 30-reduction 0.0 0.0 1.5 1.0 2.0 I_n (kA) 20 $I_{\rm n} \sim 1.5 \, \text{k/}$ (× 2.0 (× 0) 1.5 ⊥ 1.0 dT_e/dr_{eff} **Rational surface** 10 (magnetic island) is formed 0.0 Temperature gradient increases 0.0 1.0 r/a above ~0.7 kA by eITB formation 0 280 220 240 260

 $P_{\text{FCH}^{\text{Injection}}}/n_{e^{\text{LineAverage}}} (kW \cdot m^{3} x 10^{-19})$

Summary

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The Electron internal transport barrier(eITB) formation is determined not only by the neoclassical transport through the helical ripple but also by the existence of low-order rational surface.

(1) Although the eITB of the helical plasma can be formed without the loworder rational surface, **the rational surface which is made by the current increase can expand the improved confinement region.**

(2) The power threshold for the eITB formation decreases due to the existence of the rational surface or the magnetic island on the eITB formation.