Internal Transport Barrier Simulation in Helical and Tokamak Systems

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The transport simulation studies have been carried out focusing on the Internal Transport Barrier (ITB) formation and the pellet injection for density profile control. The ITB model is based on the GyroBohm-like transport with the *ExB* shear flow effects, which has already been compared with the LHD experimental electron ITB [1]. The radial electric field in the helical system was calculated based on the neoclassical rippled transport model with multi-helicity magnetic components in finite-beta equilibrium. This model is introduced into the toroidal transport linkage code (TOTAL code) and is applied to the H-mode formation of both helical and tokamak plasmas.

For the increase in the fusion reactor power gain, the density peaking is important. In the TOTAL code the neutral gas shielding model with relocation model for the comparisons with the high-field-side (HFS) and low-field-side(LFS) pellet injection. The effectiveness of the HFS pellet injection in the tokamak system is demonstrated in the TOTAL code, and no clear effects are not introduced in the helical systems.

The relationship between the H-mode simulation and the pellet injection density control simulation will be clarified in the Conference.

Reference:

[1] J. Garcia, K. Yamazaki, J. Dies, and J. Izquierdo, “Analysis of Bifurcation Phenomena in the Electron Internal Transport Barrier in the Large Helical Device”, Phy. Rev. Lett. 96, 105007 (2006).