ICRF heating Simulation in 3D Magnetic Field Configuration

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Radial transport of energetic particles due to the ripple trapped particle is one of important issues in the development of a reactor based on the helical system. The behaviors of trapped particles are complicated and have relatively large orbit size in the radial direction in helical systems. These radial motions of trapped particle would enhance the radial transport of energetic ions. Thus, a detail study of energetic ion confinement is necessary for the helical system.

In LHD, the experiment for energetic ion confinement has been successfully done. ICRF heating experiments have shown significant performance of this heating method and up to 400keV of energetic tail ions have been observed by fast neutral analysis. Also, confined energetic beam ions are observed in the NBI heating experiment. These measured results indicate a good property of energetic ion confinement in LHD. However, the measured information is obtained as an integrated value along a line of sight and we need a reliable theoretical model for reproducing the energetic ion distribution to discuss the confinement of energetic ions.

In this paper we study the complex behavior and radial transport of energetic ions during ICRF heating using a global transport simulation code (GNET)[1,2] in LHD. This code solves a linearized drift kinetic equation for energetic ions including complex behavior of trapped particles in 5-D phase space. We make clear the characteristics of energetic ions distribution in the phase space and show the confinement property of LHD configurations by comparing the simulation and experimentally observed results.

[1] S. Murakami, et al, Nuclear Fusion **40** (2000) 693.
[2] S. Murakami, et al, in Proc. 28th EPS Conf. on Controlled Fusion and Plasma Phys. Madeira, ECA-**25A** (2001) 1497-1500.