

Temporal Change of Particle Transport of Super Dense Core Plasma in LHD

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Highly peaked density profile was obtained in the pellets injected discharge in LHD. The peaking factor, which is ratio of central and volume averaged density increased from around 0.8 in the gas puff fueled phase, up to more than 2.0 after multiple pellet injected. The core density reached to several times 10^{20}m^{-3} . This type of discharge is called Super Dense Core (SDC) discharge.

The temporal change of density profiles are measured by using a CO_2 laser imaging interferometer with fine spatial resolution, of which chord spacing is 7.5mm for 80 channels. The change of the particle flux was estimated from the temporal variation of density profiles. The diffusion coefficient and convection velocity were obtained from temporal trace of the relation between normalized density gradient and normalized particle flux. The highly peaked profiles were due to the low diffusion in the core and enhanced diffusion combined with inward pinch in the edge region. As the result, the central density decreased more slowly than the edge density.

Connection with change of heat flux and fluctuation behavior is also discussed.