**Observation of Energy Channeling from Energetic Ions to Bulk Ions via Energetic Ion Driven Geodesic Acoustic Mode (EGAM) in LHD**

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**Abstract**

In a reversed magnetic shear (RS) plasma produced by tangential counter neutral beams having high energy of ~150 keV in LHD, bulk ion temperature in the plasma central region sometimes increases in time for ~0.3s by a factor of ~ 1.6 and reaches electron temperature (Te(0)~ 1.4 keV) during a phase of constant line averaged electron density and absorbed neutral beam power. Potential fluctuation amplitude measured by HIBP(heavy ion beam probe) of EGAM, which localizes in the plasma center having the peak value of ~ 1.2 kV, decreases noticeably ( by about ~30- 40% ) and keeps nearly constant level in the ion temperature rising phase. The ion temperature increase ceases by a sudden and large jump up of the EGAM amplitude, accompanying a sudden drop in the reversed shear Alfven eigenmode (RSAE) and EGAM frequencies. The event of the frequency drop is thought to be due to rapid change of the rotational transform profile. Micro-turbulence density fluctuations in the plasma core region measured by CO2 laser phase contrast imaging are not suppressed but slightly enhanced in the range of k\_perp\*rho\_i ~ 1(k\_perp: perpendicular wavenumber, rho\_i: bulk ion gyro radius). Density fluctuations in plasma edge region remain unchanged. In this RS plasma, about 95% of absorbed NBI power is transferred to electrons and only 5% is transferred to bulk ions. Bulk ion heating power density estimated from experimental data is comparable to the power density generated by ion Landau damping of EGAM excited. Here, time evolution of the rotational transform at the plasma center is inferred by using the data of MSE diagnostic, observed fundamental and 2nd order RSAEs and VMEC equilibrium calculations. The ion-temperature-increase observed in the central region of the LHD plasma is thought to be an example of *energy channeling from energetic ions to bulk ions* via EGAM.