Electric Pulsation in Electron-Root Internal Transport Barrier in Large Helical Device

T. Ido, A. Shimizu, M. Nishiura, S. Kato, H. Nakano, A. Nishizawa, M.Yokota, S.Kubo, T. Shimozuma, Y. Yoshimura, H. Igami, Y. Takeiri, Y. Oka, K. Tsumori, M. Osakabe, K. Ikeda, K. Nagaoka, O. Kaneko, Y. Nagayama, K.Narihara, I. Yamada, K. Tanaka, K. Kawahata, Y. Hamada and the LHD experimental group

(e-mail : ido@LHD.nifs.ac.jp)
National Institute for Fusion Science

Intermittent pulse of electrostatic potential is observed in plasmas with electron-root internal transport barrier (e-ITB) in Large Helical Device (LHD), using heavy ion beam probe (HIBP).

Positive radial electric field is usually formed with a steep gradient near the plasma center in the e-ITB plasma. The transport barrier seems to be steady during ECH. Depending on conditions, however, the negative spikes in the potential signal appear in the barrier. When the potential drops, the gradient of the radial electric field decreases at the transport barrier, and the increase in the edge electron temperature is also observed instantaneously. The pulse phenomenon is quite similar to the electric pulsation discovered in Compact Helical System (CHS).

The time scale of the potential change is closely related to physical mechanism of the formation of the potential. The time scales in the drop and recovery phase are about 100 μs and 500 μs, respectively. They seem to be longer than those in CHS. The difference will be discussed from the point of view of the neoclassical theory.