A structural change of potential responding to energetic ion driven MHD bursts was discovered around last closed flux surfaces (LCFS) in a helical device, Heliotron J. In Heliotron J, a variety of energetic-ion-driven MHD phenomena, which are kinds of Alfvén eigenmode (AE), are observed in low density NBI plasmas [1]. Multiple Langmuir probes located at different toroidal/poloidal sections were employed to measure edge fluctuation around last closed flux surface (LCFS). The structural change of potential around LCFS was observed when energetic-ion-driven MHD bursts appear periodically [2]. The responses are perfectly synchronized with the burst, and strongly correlates with the amplitude of each burst. In a single burst phenomenon, plasma potential drops/recovers as the MHD fluctuation amplitude increases/decreases. Other diagnostics such as interferometer, beam emission spectroscopy and electron cyclotron emission do not show clear response, and hence electron density and temperature profile do not change much in each burst. One of the candidates to explain this potential response is a radial current caused by anomalous fast ion loss generated by the MHD bursts because the loss of fast ion should also be correlated with the growth and decay of the MHD behavior [3]. Indeed, the existence of the fast ion loss linked with the MHD bursts was observed. The radial phase delay of ion saturation current response, which is corresponding to radial transport of fast ions, were observed in a MHD burst. This experimental observation suggests that such MHD instabilities may have influences on the confinement property of bulk plasma through change of electric field structure.
