§25. Redistribution of Energetic Particles by MHD Bursts on Large Helical Device

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During the high-beta experiments of 4th- and 5th-experimental campaign with the configuration of R_{ax}=3.6 [m] and Bt=0.5~0.75 [T], the fast change of energetic neutral particles being associated with MHD burst signals were observed on the tangential E//B-NPA as shown in Fig.1. The signals of fast neutral particles of around 130-keV were increased when the MHD-bursts were observed. The signal increase of slower neutral particles occurred after the increase of the fast particles. It seems that the increased neutral flux has a characteristic time in its decay in energy.

Since the fast neutral particle measurement is the result of the product between the fast ion density of interested energy and the density of low energy neutrals which is coming from the plasma periphery, we must be careful about on which density MHD-bursts had their influences. If MHD-bursts had their influences on the peripheral neutral density, the effect should appear on the H-alpha signal and the influences on NPA-signals should not have the time delay depending on the detected particle's energy. Therefore, the flux increase of the fast neutral was considered to be the result of the change of the fast ion populations in plasmas.

The energy decay time of the increased neutral flux was compared to the slowing-down time along various orbits which are tangent to the NPA line of sight. The slowing-down time at $\rho_{avg.}$=0.55 well express the temporal behavior of the experimental decay time, where $\rho_{avg.}$ expresses the minor radius being averaged along the orbit. It is turned out the signal increases at the energy of around 130-keV directly correlate to the MHD bursts, and the signal increases at the lower energy is just the results of the slowing-down process of the increased fast-ion populations at around 130-keV.

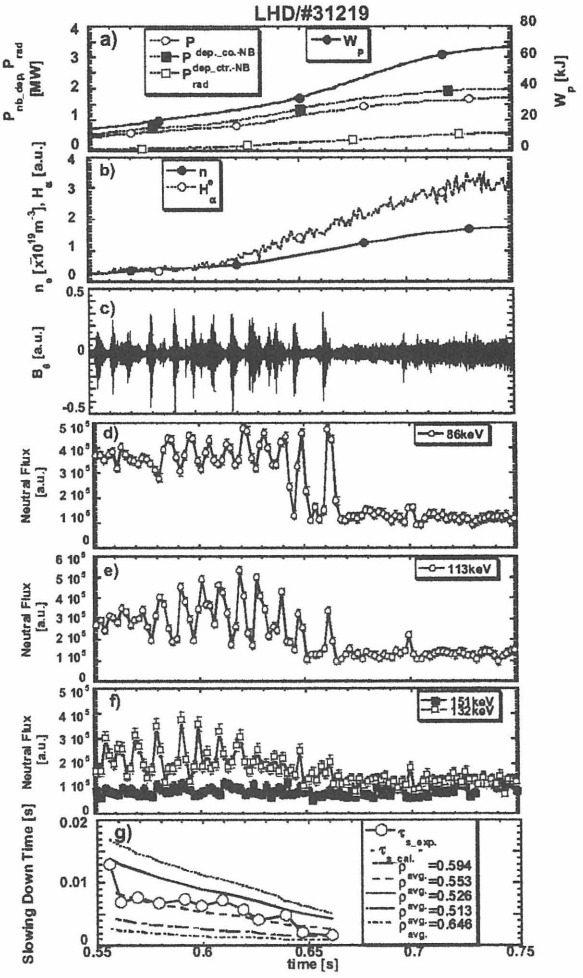

Fig.1 Typical wave forms of a discharge where neutral flux increases associated MHD bursts were observed. a)Stored energy, Deposition power of co.-Neutral Beam, that of counter.- and radiation power are shown. b) Line averaged electron density and H_α signals are shown. c) Magnetic fluctuation signals (B_θ) measured by a Mirnov-coil is shown. d)-f) Neutral Flux signals measured by E//B-NPA for 86-keV, 113-keV, 132-keV and 151-keV are shown. g)The evaluated enegy decay time of the increased flux (lines with open circles) are compared with the slowing-down times along the various orbits which are tangent to the NPA line of sight.