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EX/5-1: Dynamics of Energetic Particle Driven Modes and MHD Modes in Wall-stabilized High Beta Plasmas on JT-60U and DIII-D

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In the wall-stabilized high-beta plasmas in JT-60U and DIII-D, interesting interactions of energetic particle (EP) driven modes and MHD modes have been observed. First, EP-driven modes trigger resistive wall modes (RWMs) and edge localized modes (ELMs).

In both devices, EP-driven modes have been observed in the high-beta plasmas above the no-wall beta limit; these modes are called 'Energetic particle driven Wall Mode (EWM)' in JT-60U and 'Off-axis Fishbone Mode (OFM)' in DIII-D. The triggering of ELM by the EWM/OFM is found to correlate with EP transport induced by the EWM/OFM. Moreover, the triggering of RWM by the EWM/OFM is thought to be due to reduction of the EP stabilization effect on the RWM stability. Second, a slow $n=1$ magnetic oscillation has been observed together with an ELM. This $n=1$ magnetic oscillation seems to occur due to ELM before the RWM onset, thus, the RWM stability is becoming marginal. Since the time scale of this oscillation is comparable to the marginal RWM time scale, this is considered to be the ELM-impacted RWM.

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