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EX/P4-10: Mitigation of Large Amplitude Edge-Localized-Modes by Resonant Magnetic Perturbations on the Large Helical Device

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The Large Helical Device (LHD) produces H-mode plasmas with large amplitude edge-localized-modes (ELMs). The ELMs are induced by interchange modes destabilized at the $\iota=1$ rational surface in the stochastic field region just outside the last closed flux surface. These large amplitude ELMs expel large amount of plasma stored energy from the edge transport barrier (ETB) region, that is, up to 20% of the stored energy (W_p). Resonant magnetic perturbations (RMPs) with dominant $m=1/n=1$ component have clearly reduced the ELM amplitude and increased the ELM frequency. In this mitigated case, the energy loss by an ELM pulse is reduced less than 5% of W_p . The RMPs have reduced edge electron density preferentially, without modifying electron and ion temperature profiles noticeably. The RMPs slightly reduced the confinement improvement factor H averaged over ELMing phase for the ISS04 stellarator scaling having gyro-Bohm character.

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