H-Mode Pedestal Structure and Transport in Hybrid Plasmas During Magnetic Perturbation in the DIII-D Tokamak*

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The effect of resonant magnetic perturbation (RMP) on the H-mode pedestal structure is studied in hybrid discharges in the DIII-D tokamak. The empirical window for complete edge localized mode (ELM) suppression appears to be the same as in standard H-mode plasmas, which is $3.5 < q_{95} < 3.9$. A reduction in the pedestal bootstrap current during RMP is inferred through a decrease in q_{95} at fixed I_p/aB_T, consistent with the measured reduction in the edge pressure gradient. The parallel current profile in the pedestal is consistent with the Sauter model, both before and during RMP. Although ELM suppressed hybrid discharges are calculated by the ELITE code to be stable to peeling-ballooning modes during RMP, small amplitude ELMs are observed to return when the rotation frequency becomes small or when q_{95} is outside the resonance window for ELM suppression. The presence of small amplitude ELMs during RMP is associated with an increase in pedestal electron temperature and a decrease in the calculated magnetic field line diffusion. These are probably not Type I ELMs because peeling-ballooning stability is maintained. The pedestal height and width in these cases will be compared with predictions from the EPED1 model.

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