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Pedestal Stability Impact of edge ECCD and ECH during RMP ELM suppression

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Recent experiments on the DIII-D tokamak show access to edge localized mode (ELM) suppression with resonant magnetic perturbations (RMP) is affected by electron cyclotron heating (ECH) and current drive (ECCD) in the plasma edge region (rho˜0.9-0.95). It is found that application of co-Ip ECCD can lead to the return of edge localized modes (ELMs), while heating the plasma with matching ECH power or counter-Ip ECCD does not lead to termination of ELM suppression. Neither a change in ExB shearing rate profile nor a move of rational surfaces with respect to the pedestal top can explain the effect. With a size of around 1-3% of the stored energy, these ELMs are generally smaller than typical type I-ELMs and display characteristics of a limit cycle oscillation. Using pedestal stability analysis with ELITE [1], it is shown that the plasmas are still located in the deeply stable region of the peeling-ballooning stability map, consistent with the observation that ELMs are grassy rather than of a type-I nature. Furthermore, no significant difference is found between the suppressed ECH case and the ELMing co-Ip ECCD case within the ELITE code, based on the axisymmetric EFIT equilibrium. Hence, these results are consistent with the hypothesis that during RMP ELM suppression an island is formed on the pedestal top [2,3] and that the co-IP ECCD modulates the island size sufficiently to cause the return of smaller ELMs.

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References

[1] P.B.Snyder, et al., Physics of Plasmas 9, 2037 (2002)
[2] R. Nazikian, et al., Physical Reivew Letters 114, 105002 (2015).
[3] C. Paz-Soldan, et al. Nuclear Fusion 56, 056001 (2016)

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