

RMP-Induced Magnetic Shear and Implications for Stability, Blob Transport and Radial Electric Fields

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Observations on DIII-D show that resonant magnetic perturbations (RMP) can stabilize ELMs, increase radial particle transport (in low collisionality regimes), and modify E_r in the edge plasma. Based on the importance of magnetic shear, sheaths and “disconnection” of electrostatic potentials along B in previous studies of linear stability and nonlinear blob-filament dynamics, we are led to consider the possible role of these effects in the presence of RMP. When applied RMP fields are of sufficient magnitude to induce stochasticity, it is expected that the magnetic shear is modified. Using an analytic field-line mapping model, we estimate the size of the RMP-induced magnetic shear. We then present a preliminary assessment of the consequences of this extra shear for: the stability properties of the edge plasma, the propagation characteristics of blob-filaments, and the penetration of sheath potentials into the plasma.