Effects of Resonant Magnetic Perturbations on Edge Density Profile in DIII-D*

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Large Type-I edge localized modes (ELMs) have been suppressed by using the internal coils (I-coils) in DIII-D. In these ELM-suppressed operations, detailed edge electron density profile evolution with magnetic perturbations has been investigated via a high temporal (25 μs) and spatial (≥2 mm) resolution reflectometry measurement to study the edge transport during resonant magnetic perturbations (RMP). At low collisionality, it is observed that the density pedestal height and gradient decrease, indicating enhanced particle transport induced by RMP in the edge. Increased density fluctuations measured by FIR and fluctuation reflectometry are consistent with enhanced transport. During I-coil phase, the scrape-off layer (SOL) density perturbations due to high field side pellet injection increase, different from the perturbations without RMP. At high collisionality, the SOL density profile is modified by the irregular D_α oscillations during the I-coil phase. The strong transient Type-I ELM-induced transport is replaced by the less impact transport associated with the irregular D_α oscillations during I-coil phase. Although the pedestal gradient reduces slightly, the pedestal height remains unchanged. The comparison of edge profile evolution with magnetic perturbations between low and high collisionalities is presented.

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