

ELM suppression in hybrid discharges using $n = 3$ magnetic perturbations on DIII-D

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Abstract. Large type-I edge localized modes (ELMs) are completely suppressed in hybrid discharges for the first time by applying an edge resonant perturbation (RMP) using an internal coil set with toroidal mode number $n = 3$. In these experiments on the DIII-D tokamak, the ELM suppression lasts for ~ 1 s in plasmas with normalized beta up to $\beta_N = 2.5$ (volume average beta up to $\beta = 3.4\%$) and a fusion performance factor as high as $\beta_N H_{98y2}/q_{95}^2 = 0.2$, which is sufficient for $Q = 10$ in ITER. This is an important advance in developing hybrid discharges as a baseline operating scenario for ITER.