Toroidally resolved structure of divertor heat flux in RMP H-mode discharges on DIII-D

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Abstract

As shown on DIII-D edge localized modes (ELMs) can be either completely eliminated or mitigated with resonant magnetic perturbation fields. Application of Resonant Magnetic Perturbation (RMP) fields results in a 3D magnetic topology that affects heat loads for ELM-suppressed discharges as well as the smaller ELMs seen during mitigated scenarios. Two infrared cameras, separated 105 deg toroidally, were used to make simultaneous measurements of ELM heat loads with high frame rates. Without the RMP fields ELMs display a variety of different heat load dynamics and a range of toroidal variability that is characteristic of their 3D structure. Comparing radial averages there is no asymmetry between two toroidal locations. With RMP mitigated ELMS, the variability in the radially averaged power loads is significantly reduced even though toroidal asymmetries in power loads are introduced. In addition to RMP ELM suppression scenarios an RMP scenario with only very small ELMs has been achieved.

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