Abstract Submitted
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Study of edge He transport during resonant magnetic perturbations (RMPs) in DIII-D using a finite difference approximation of the continuity equation[1] E. HINSON, O. SCHMITZ, H. FRERICHS, UW - Madison, T. ABRAMS, M. WADE, C. CHRYSTAL, C. COLLINS, T.E. EVANS, C. PAZ-SOLDAN, D. THOMAS, GA, R.A. MOYER, I. BYKOV, UCSD, B. GRIERSON, PPPL, E.A. UNTERBERG, A. BRIESEMEISTER, ORNL, DIII-D TEAM — An impurity transport model has been developed to analyze reductions of up to 2x in effective helium particle confinement time observed during application of RMPs to suppress and mitigate edge localized modes (ELMs). This reduction during RMPs was measured in the core, edge, and pump plenum. Higher measured helium pressure and concentration at the pump suggests it was better retained there during RMPs, in excess of that due to deuterium pump-out, enabling faster pumping. A reservoir approximation of the continuity equation with diffusion and convection fits the measurements well. Transport profiles from the fits are consistent with increased helium transport near the separatrix during RMPs. An analysis with EMC3-EIRENE suggests this transport could result from new flows in the perturbed separatrix. These findings provide evidence that RMPs in future devices may provide impurity exhaust that meets or exceeds that due to the ELMs, reducing ash in a burning regime, and increasing fusion gain.

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