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Investigating the Validity of the "Magnetic Flutter" Model of Tokamak Transport in the Presence of 3D External Magnetic Fields[1]
P. RAUM, Virginia Tech., S.P. SMITH, N.M. FERRARO, General Atomics, J.D. CALLEN, U. Wisconsin-Madison, O. MENEGHINI, ORISE — The suppression of edge localized modes (ELMs) is critical for future fusion devices in order to preserve the integrity of plasma facing components. On the DIII-D tokamak, non-axisymmetric coils are used to produce 3D magnetic fields that, under certain conditions, are successful at mitigating and suppressing ELMs. These externally applied resonant magnetic field perturbations (RMPs) help increase plasma transport at the top of the pedestal where we see a reduction in electron density and temperature gradients. A "magnetic flutter" model has been proposed to explain this effect, which was originally developed for a cylindrical geometry and has recently been extended to a toroidal geometry. The toroidal model has been evaluated for a single plasma condition using an analytic model of the magnetic field perturbations in the plasma (δB) with promising results. This has motivated a more systematic test of the validity of this model using δB from the M3D-C1 code as a more accurate representation of the perturbations for a variety of discharges in which the 3D fields have been applied.

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