Abstract Submitted
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Coupling of Applied Non-axisymmetric Fields to Toroidal Torque[1] N.C. LOGAN, J.-K. PARK, J.E. MENARD, Princeton Plasma Physics Laboratory, E.J. STRAIT, C. PAZ-SOLDAN, M.J. LANCTOT, General Atomics — Recent advances in the modeling of neoclassical toroidal viscosity (NTV) have enabled realistic predictions of the coupling between applied non-axisymmetric fields and the resultant toroidal torque in the DIII-D tokamak. The strong dependence of the NTV on the amplified plasma kink response reduces the control of the non-resonant torque to a single mode model, in which the torque optimization is equivalent to an optimization of the net non-axisymmetric field's overlap with the spatial structure of the dominant mode. This single mode model has enabled efficient feed-forward correction of the $n = 1$ and $n = 2$ intrinsic error fields and $n =$1-3 proxy error fields in NTV dominated scenarios. In addition, rotation drive toward a neo-classical offset using multiple coil sets has been optimized in accordance with the single mode model. Similar linear optimization techniques could be used to design future coil sets for rotation control, while inclusion of multimodal effects will be necessary for rotation profile control.

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Nicholas Logan
Princeton Plasma Physics Laboratory

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