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TEM-turbulence in stellarators and its optimization[1] JOSEFINE H.E. PROLL, Max-Planck/Princeton Center for Plasma Physics, PER HELANDER, Max Planck Institute for Plasma Physics, Wendelsteinstr. 1, 17491 Greifswald, Germany, SAMUEL LAZERSON, HARRY MYNICK, Plasma Physics Laboratory, Princeton University, P.O. Box 451 Princeton, New Jersey 08543-0451, PAVLOS XANTHOPOULOS, Max Planck Institute for Plasma Physics, Wendelsteinstr. 1, 17491 Greifswald, Germany — Quasi-isodynamic stellarators, which are especially optimized for neoclassical transport, have been shown to be resilient towards trapped-electrons modes (TEMs) in large regions of parameter space. In these configurations, all particles have average "good curvature." It was shown analytically that, thanks to this property, particles that bounce faster than the mode in question draw energy from it near marginal stability, so that the ordinary density-gradient-driven TEM has to be stable in the electrostatic and collisionless limit.This has been confirmed in linear flux-tube simulations that were performed with the GENE code. Several magnetic field configurations were compared and it was found that the growth rates of the TEMs drop with increasing degree of quasi-isodynamicity. These findings can be used to optimize stellarators with respect to TEM turbulence by reducing the fraction of trapped particles with bounce averaged "bad curvature." An appropriate proxy function has therefore been designed to be implemented in STELLOPT, a stellarator optimization tool that can now be used to further explore the configuration space of neoclassically optimized stellarators with the aim to extract designs with improved turbulent transport.

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