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Microinstability Comparison of Stellarator Magnetic Geometries¹ G. REWOLDT, L.-P. KU, W.M. TANG, Princeton Plasma Physics Lab. — The microinstability properties of seven distinct magnetic geometries corresponding to different operating and planned stellarators with differing symmetry properties are compared. Specifically, the kinetic stability properties (linear growth rates and real frequencies) of toroidal microinstabilities (driven by ion temperature gradients and trapped-electron dynamics) are compared, as parameters are varied. The familiar ballooning representation is used to enable efficient treatment of the spatial variations along the equilibrium magnetic field lines. These studies provide useful insights for understanding the differences in the relative strengths of the instabilities caused by the differing localizations of good and bad magnetic curvature and of the presence of trapped particles. The associated differences in growth rates due to magnetic geometry are large for small values of the temperature gradient parameter eta = d ln T / d ln n, whereas for large values of eta, the mode is strongly unstable for all of the different magnetic geometries.

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