

Study of a low β classical tearing mode in DIII-D

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Abstract

The tearing mode stability of low β plasmas is studied experimentally in the DIII-D tokamak. The linear and nonlinear characteristics of the plasma are measured and compared with theoretical predictions. In contrast to the neoclassical tearing mode which occurs at high β and is dominated by the bootstrap current effect, in the low β regime the neoclassical bootstrap current effect is minimal. Thus the stability properties are more amenable to comparison with presently available theoretical codes. In the linear phase, the onset of the instability has been found to be predictable from equilibrium reconstruction to agree with the availability of the tearing mode free energy. In the nonlinear phase, the temperature and its fluctuation amplitude and phase have been fitted to the prediction of achieving a perturbed 3-D equilibrium with an assumed perturbation eigenfunction.

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