The Relative Roles of Electromagnetic and E×B Stabilization in JET High-Performance Discharges

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Abstract

It has been shown [1,2] that electromagnetic stabilization dominates **E×B** flow shear in certain high-performance JET discharges. Furthermore, fast ions (beam, He3) were shown to be a major contributor to the electromagnetic stabilization. These conclusions were based on results from the GENE [3] code. In this work we verify these results using the GYRO [4] code. Comparing code results (linear frequencies and eigenfunctions, and nonlinear fluxes) from different gyrokinetic codes as a means of verification (benchmarking) is only convincing if the codes agree for more than one discharge. Otherwise, agreement may simply be fortuitous. Therefore, we analyze three discharges: a simplified, two-species, circular geometry case based on an actual JET discharge; an L-mode discharge with a significant fast-ion pressure fraction; and a carbon-wall low-triangularity high-beta hybrid discharge. All discharges were analyzed at $r/a = 0.33$ where significant ion temperature peaking is observed. The GYRO simulations support the conclusion that electromagnetic stabilization is strong, and dominates **E×B** shear stabilization.

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