

Current Drive for Stabilizing Magnetic Islands

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The magnetic island evolution under the action of a current generated externally by electron cyclotron wave beams is studied using a reduced resistive magnetohydrodynamics plasma model. We investigate how the topological and geometrical aspects, related to the beam amplitude and width as well as to the island width and modification, influence the control effectiveness, revealing new features in comparison with the zero-dimensional model of the generalized Rutherford equation. In particular the occurrence of flip or Kelvin-Helmholtz instabilities when the current injection is applied to small or large magnetic islands respectively are features that need to be taken into account in designing tearing mode control systems based on radio frequency current-drive.