

Intrinsic rotation of magnetic island with finite width

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The neoclassical tearing mode is a nonlinear instability where the width of magnetic island is finite. It is pointed out that the rotation of the magnetic island is one of important factors in the evolutions of the island with finite width because the sign of polarization current term in the Rutherford equation is determined by the rotation of magnetic island[1,2]. Since there is no degree of freedom determining the island rotation in conventional MHD models, we have investigated the rotation of magnetic island based on a reduced two fluid model[3] which includes both effects of ion and electron diamagnetic drifts as well as the ion parallel motion.

As a first step, we have performed linear numerical simulations in two-dimensional slab geometry to examine the rotation of the magnetic island. It is found that the magnetic island with the wavelength $\lambda_y = 2\pi/4$ (or $2\pi/5$) changes its direction of rotation as the ratio of ion temperature to electron one becomes larger whereas the linear growth rates changes little in the linear regime, where λ_y denotes the poloidal wavelength of the magnetic island. We will show the rotation of magnetic island with finite width in the nonlinear regime.

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