

Turbulence driven magnetic reconnections causing magnetic islands with long wavelengths

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Numerical simulations of reduced two-fluid equations show that micro-turbulence causes magnetic reconnection and produces magnetic islands with long wavelengths even if the equilibrium is stable against tearing modes. Thus, the turbulence modifies the threshold of magnetic island formation against stability parameter of tearing mode. The length of magnetic islands is the same order as the system size and the width is several times of ion Larmor radius. This suggests that micro-turbulence can cause seed magnetic islands of neoclassical tearing modes, which are the main nonlinear instability that limits plasma pressure in magnetically confined plasmas.