Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Turbulence Suppression in a coherent structure of localized current and vorticity J.-H. KIM, University of Wisconsin-Madison, P.W. TERRY, Univeristy of Wisconsin-Madison — Motivated by the quasi-single helicity state of reversed field pinches, we examine turbulence suppression by a localized vortex structure of electric current and flow vorticity within the framework of reduced MHD. Assuming that the vortex structure evolves on a slower time scale than an Alfven time scale of turbulent fluctuations, a boundary layer between turbulent fluctuations and the coherent structure forms through the balance of the turbulent decorrelation rate and the shearing rates. The dependence of the boundary width on shear and turbulence is obtained applying a variant of eddy-damped quasinormal Markovian (EDQNM) closure to the turbulent fluctuation and applying asymptotic analysis for strong shear. The coherent structure of localized current and flow vorticity can suppress ambient turbulence through magnetic field shear or flow shear. Also, both shear effects may combine to suppress the turbulence. The suppression mechanism can be classified into magnetic shear dominant, flow shear dominate, or intermediate. The details will be presented. The life time of the coherent structure is presented in each case. Simple numerical calculation will be presented as a test case.

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Date submitted: 18 Jul 2011 Electronic form version 1.4