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Rossby Wave-Zonal Flow Turbulence in a Tangled Magnetic Field[1] CHANG-CHUN CHEN, PATRICK DIAMOND, University of California, San Diego, STEVEN TOBIAS, University of Leeds — Rossby wave-zonal flow turbulence frequently occurs in the presence of a tangled stochastic magnetic field. Tangled fields that coexist with an ordered mean field play a key role in turbulence in the solar tachocline and in magnetic confinement devices. Simulations show that interaction of the tangled field with Rossby turbulence is multi-faceted. We are interested in how tangled small-scale stochastic magnetic fields might affect the waves and the zonal flow by modifying the transport of mean potential vorticity. To understand the physics of this nonlinear system, we consider a model with the prescribed tangled fields. This tangled-field dominated system with high Kubo number cannot be treated by standard quasilinear theory. We develop a double averaged theory and construct quasilinear-type expressions for the vorticity flux and stresses. Our principal results are that the random-field induced stresses damp the Rossby waves, and that the phase relation in vorticity flux is modified by the tangled field. This leads to a suppression of zonal flows which occurs at levels of field intensities well below that of Alfvnization, where Maxwell stress balances the Reynolds stress. Ongoing work is focused on understanding the feedback of shears on the small scale field.

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