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A Theory of Weak Magnetohydrodynamic Turbulence in the Solar Tachocline SHANE KEATING, PATRICK DIAMOND, UC San Diego — It has been argued [1] that any self-consistent model of the solar tachocline must incorporate some large-scale primordial magnetic field in the interior to maintain solid rotation there against the "burrowing" action of the convection zone. Here, we seek to develop a theory of weak MHD turbulence in the presence of intense stable stratification, and to calculate the radial transport of magnetic flux from the interior into the tachocline. Quasilinear analysis of the 2D resistive MHD equations coupled to a bouyancy force suggests that such transport is strongly quenched. A more sophisticated approach, based on multiple time- scale seperation, leads to a wave-kinetic formalism. Analysis is under way for certain special triad classes, in the presence of a "sea" of internal waves. Finally, it is hoped that a calculation of the turbulent resistivity will lead to an estimate of the thickness of the solar tachocline.

[1] D. Gough and M.E.McIntyre, Nature 394, 755-757.

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