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Angular momentum transport by magnetic fields

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The cores of (sub)giants rotate much slower than expected from known hydrodynamic braking mechanisms. Magnetic torques generated by differential rotation are potentially much more effective. I'll briefly review magnetorotational and Tayler instabilities, which in their current versions are also insufficient. A big problem facing improvement are a number of critical surprises encountered in numerical studies of 'magnetic turbulence'. These are the numerical convergence problem, the magnetic Prandtl number problem, and the conserved magnetic flux problem. Each of these is still unsolved. The result is a lack of theoretical basis for any proposed theory of magnetic torques. Progress will depend heavily on results from numerical simulations designed for specific clearly defined (sub)questions.

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