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The Magnetic Shear Current Effect in the Solar Dynamo[1]
VALENTIN SKOUTNEV, Princeton University, JONATHAN SQUIRE, University of Otago, AMITAVA BHATTACHARJEE, Princeton University — Recently, the magnetic shear current (MSC) effect has been identified as a possible dynamo mechanism in accretion disks driven by the magnetorotational instability[1]. We present a study incorporating the MSC effect into the dynamics of a model solar tachocline. Using the Dedalus framework[2], we solve the anelastic MHD equations in a box containing a convective layer on top of a stratified radiative layer in which a vertical shear flow is present. We argue that the MSC operates in the upper shear region driven by convective overshoot turbulence and present the effects of the generated large scale magnetic fields in our model. Discussion of the presence of the MSC effect will also be presented. Studying the efficiency of magnetic field generation and/or storage in the tachocline is crucial for understanding the its role in the global solar dynamo cycle. [1]Squire, J., Bhattacharjee, A. (2015). Generation of large-scale magnetic fields by small-scale dynamo in shear flows. PRL, 115(17), 175003. [2]Burns, K., et. al. (2019). Dedalus: A Flexible Framework for Numerical Simulations with Spectral Methods. arXiv preprint arXiv:1905.10388.

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