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Angular Momentum Transport in Thin Magnetically Arrested Disks[1] MEGAN MARSHALL, Univ of Maryland-College Park, MARK AVARA, Rochester Institute of Technology, Center for Computational Relativity and Gravitation, JONATHAN MCKINNEY, Univ of Maryland-College Park — In accretion disks with large-scale ordered magnetic fields, the magnetorotational instability (MRI) is marginally suppressed, so other processes may drive angular momentum transport leading to accretion. Accretion could then be driven by large-scale magnetic fields via magnetic braking, but large-scale magnetic flux can build-up onto the black hole and within the disk leading to a magnetically-arrested disk (MAD). Such a MAD state is unstable to the magnetic Rayleigh-Taylor (RT) instability, which itself leads to vigorous turbulence and the emergence of low-density highly-magnetized bubbles. This instability was studied in a thin (ratio of half-height H to radius R, $H/R \approx 0.1$) MAD simulation, where it has a more dramatic effect on the dynamics of our disk than on thicker disks. We find the low-density bubbles created by the magnetic RT instability decrease the stress (leading to angular momentum transport) in the disk rather than increasing magnetic torques. Indeed, we find the dominant component of the stress is due to turbulent magnetic fields, despite the suppression of the axisymmetric MRI and the dominant presence of large-scale magnetic fields. This suggests the magnetic RT instability plays a significant role in driving angular momentum transport in MADs.

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