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Saturation of the Magnetorotational Instability KEITH JULIEN, University of Colorado at Boulder, EDGAR KNOBLOCH, University of California at Berkeley — An analytical theory is presented [1,2] that describes asymptotically exactly the process of nonlinear saturation of the magnetorotational instability in a strongly nonlinear regime. The theory is applied to a model problem employing a linear shear flow in a uniformly rotating channel, and can be extended to annular domains. The theory shows that the instability saturates by modifying the shear responsible for it, and that both viscous and ohmic dissipation are required to achieve saturation. The theory also describes the approach from small amplitude perturbations to the final strongly nonlinear saturated state. Possible applications to recent laboratory experiments as well as to accretion disks will be discussed.

[1] E. Knobloch and K. Julien, Phys. Fluids 17, 094106 (2005).
[2] K. Julien and E. Knobloch. J. Math. Phys. 48, 065405 (2007)

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