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Understanding and Controlling Turbulent Mixing in a Laboratory Magnetosphere[1] M.E. MAUEL, Columbia University — In a laboratory magnetosphere, plasma is confined by a strong dipole magnet, and complex nonlinear processes can be studied and controlled in near steady-state conditions. Because a dipole's magnetic field resemble the inner regions of planetary magnetospheres, these laboratory observations are linked to space plasma physics. Unlike many other other toroidal configurations, interchange and entropy modes dominate plasma dynamics, and turbulence causes self-organization and centrally-peaked profiles as the plasma approaches a state of minimum entropy production. We report progress in understanding and controlling turbulent mixing through a combination of laboratory investigation, modeling, and simulation. Topics discussed: (i) extending the global extent of local regulation of the interchange and entropy mode turbulence through current injection, (ii) measurement and interpretation of the statistical properties of stationary turbulence, and (iii) advancements in the nonlinear simulation of turbulence control in a dipole plasma torus.

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