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Flows and Transport Driven by Electron Temperature Gradients DAVID C. PACE, University of California, Los Angeles, JAMES E. MAGGS, GEORGE J. MORALES, MEIXUAN SHI — An experimental study is made of the plasma flows and heat transport associated with controlled electron temperature gradients established in a large magnetized plasma. The phenomena investigated illustrates processes encountered in magnetic and inertial fusion, and in space observations. Axial and transverse electron temperature gradients are established in the LAPD-U device by injecting a narrow electron beam into a cold afterglow plasma. The beam energy is less than the ionization energy of the background neutral gas and the conditions approximate a localized heat source embedded in an infinite, strongly magnetized plasma. For low heating powers and/or short times, classical heat transport prevails and temperature gradients are formed both parallel and perpendicular to the applied magnetic field. As the heating power is increased, flows develop and drift-Alfven waves become unstable. Late in time these features evolve into broadband turbulence and result in anomalous transport that exhibits various spatio-temporal patterns. This study focuses on the properties of the flows and the spectral features that trigger the transition from coherent fluctuations to broadband turbulence.

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