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Thermal Waves in a Magnetized Plasma DAVID PACE, M. SHI, J.E. MAGGS, G.J. MORALES, UCLA — In recent years the topic of "thermal waves" has received considerable attention outside the plasma community. This peculiar phenomenon refers to the temperature fluctuations that arise when a system, described by a thermal diffusion equation, is subjected to an oscillating heat source. By measuring the propagation characteristics of the oscillatory temperature signals it is possible to determine the thermal conductivities of gases and solids to great precision. The present study uses observations of selfmodulated temperature fluctuations arising in a thermal filament produced by a small, low-voltage beam to study the behavior of thermal waves in a magnetized plasma. The beam is injected, at fixed voltage, into the large LAPD-U device and, in the absence of self-modulation, it creates a quiescent temperature filament 6 meters long and 0.5 cm diameter. When temperature modulations arise, axial and radial propagation of thermal waves are clearly detected. Comparison of the measured phase speeds to theoretical predictions, and to results of a transport code, show excellent agreement with the classical conductivities due to Coulomb collisions. This classical transport behavior has been independently verified in the absence of modulation. An assessment is made of the utility of a voltage-modulated beam source designed to diagnose the thermal conductivity of plasmas based on thermal waves.

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