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Towed-grid system for production and calorimetric study of homogenous quantum turbulence[1] ROMAN CIAPURIN, KYLE THOMPSON, GARY G. IHAS, University of Florida — The decay of quantum turbulence is not fully understood in superfluid helium at milikelvin temperatures where the viscous normal component is absent. Vibrating grid experiments performed periously produced inhomogeneous turbulence, making the results hard to interpret. We have developed experimental methods to produce homogeneous isotropic turbulence by pulling a grid at a variable constant velocity through superfluid 4He. While using calorimetric technique to measure the energy dissipation, the Meissner effect was employed to eliminate all heat sources except from turbulent decay. A controlled divergent magnetic field provides the lift to a hollow cylindrical superconducting actuator to which the grid is attached. Position sensing is performed by measuring the inductance change of a coil when a superconductor, similar to that of the actuator, is moved inside it. This position sensing technique proved to be reliable under varying temperatures and magnetic fields, making it perfect for use in the towed-grid experiment where a rise in temperature emerges from turbulent decay. Additionally, the reproducible dependency of the grid's position on the applied magnetic field enables complete control of the actuator's motion.

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