

Abstract Submitted
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“Classical” experiments in a quantum fluid JOSEPH NIEMELA,
Abdus Salam ICTP — The canonical method of creating a nearly isotropic and homogeneous turbulent flow is to force a fluid through a grid of crossed bars, usually by placing a stationary grid past a stream of air or water in a wind or water tunnel. Particular focus in this talk will therefore be placed on the development of a series of analogous measurements in which a grid is towed through a stationary sample of a quantum fluid, superfluid ^4He , contained in a small, 1 cm^2 , cross-section square channel, for mesh Reynolds numbers up to 200,000. The rate of decay of the length of quantized vortex line per unit volume can be measured with some precision over a period during which it has decayed by roughly six orders of magnitude, and is indirectly reconciled with a classical Kolmogorov description with an effective kinematic viscosity that is proportional to the quantum of circulation. As the development of novel instrumentation for use in turbulent flows at low temperatures remains an important problem, some recent experimental developments, particularly in providing optical diagnosis and visualization of superfluid ^4He flows, will also be highlighted.

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