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Self-consistent calculation of a spherical particle's motion in a tangle of superfluid vortices DEMOSTHENES KIVOTIDES, S. LOUISE WILKIN, University of California Santa Barbara — In thermal superfluid turbulence[1], a superfluid component interacts via mutual friction forces with a normal-fluid component. At present, there are no experimental methods for the direct measurement of the local normal-fluid velocity in such systems. Recently, experimentalists[2,3] introduced micron-sized particles in thermal superfluids and measured (using Particle Image Velocimetry) their velocity. What is the relation between the measured particle velocity and the superfluid or normal-fluid velocities? Since superfluid turbulence is characterized by complex tangles of nanometer core size vortices that appear as ideal line vortices at the scale of the particles and reconnect with the latter, the answer to this question is not straightforward. In response to these matters, we have recently developed methods[4] for the self-consistent computation of vortex-particle interactions that treat successfully reconnections. We report results of such calculations that, by corresponding directly to superfluid turbulence experiments, provide clues for their understanding.

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