The influence of the acoustic radiation on the onset of the turbulent flow in He II

G. Sheshin, R. Nikonkov, and I. Gritsenko

B.Verkin Institute for Low Temperature Physics and Engineering, Kharkov, Ukraine

The experimental study are carried out of the influence of acoustic emission on development of turbulent flow in He II at 350 mK and at various pressures, from the vapor pressure to that of 4He crystallization. The experimental technique of oscillating quartz tuning fork was applied for simultaneous exciting both superfluid flow, near the oscillating tuning fork prongs, and the acoustic wave radiation. The flow rate of He II and the amplitude of the radiated acoustic waves was driven by voltage oscillations which excited the fork prongs. Furthermore, the power of an acoustic wave depends on the density and sound velocity in He II as (ρ/c^5), which in turn depends on the pressure. This allowed to measure the influence of the amplitude of acoustic emission on the flow in He II by changing the pressure. It was found that the decrease in power, emitted by the acoustic wave tuning fork, reduces the critical velocity for the transition from laminar to turbulent flow.

Section: QF - Quantum Fluids

Keywords: acoustics, superfluid flow, turbulence