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Transition to Turbulence of Flow Due to a Vibrating Quartz Fork in Classical and Quantum Fluids[1] LADISLAV SKRBEK, Joint Low Temperature Laboratory, Institute of Physics ASCR and Faculty of Mathematics and Physics, Charles University, V Holesovickach 2, Prague, MICHAELA BLAZKOVA, DAVID SCHMORANZER, JOINT LOW TEMPERATURE LABORATORY TEAM — Flow due to a commercially available vibrating quartz fork at various temperatures and pressures is studied in gaseous helium, He I, and He II, over wide range of temperature and pressure. On increasing the driving force, the flow changes in character from laminar (characterized by a linear velocity versus drive dependence) to turbulent (characterized by a square root velocity versus drive dependence). In classical fluids, we characterize this transition by a critical Reynolds number, $Re_c = U_{cr}\delta/\nu$, where U_{cr} is the critical velocity, ν stands for the kinematic viscosity, $\delta = \sqrt{2\nu/\omega}$ is the viscous penetration depth and ω is the angular frequency of oscillations. This scaling is continuous through the lambda-transition and effective kinematic viscosity for He II is extracted from the temperature dependence of the transition data. U_{cr} of order 10 cm/s observed in He II agree with those found with other vibrating objects such as spheres, wires or grids, as well as with available numerical simulations of vortex motion in an applied ac flow.

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