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Generation of Turbulence by Vibrating Forks in Superfluid ⁴He LADISLAV SKRBEK, Faculty of Mathematics and Physics, Charles University, Prague, MICHAELA KRALOVA, Institute of Physics ASCR, Prague, DAVID SCHMORANZER, Faculty of Mathematics and Physics, Charles University, Prague, WILLIAM VINEN, School of Physics and Astronomy, University of Birmingham, U.K. — A study is reported of the drag on the prongs of a number of quartz forks vibrating in superfluid ⁴He, and particular attention is paid to the transitions from laminar to turbulent flow. Behavior in the normal phase is consistent with that for a classical fluid (PRE75 (2007) 025302). We focus on the observed behaviour of the drag coefficient, C_D , as a function of velocity. There is evidence that there is a sharp critical velocity at which turbulence starts to be generated in the superfluid component, and that this critical velocity may be preceded by the partial breakdown of laminar flow in the normal component. Behaviour in the superfluid phase is compared with that of other structures vibrating in superfluid 4 He. At high velocities C_D tends to that observed in a classical fluid, indicating that the two fluids, strongly coupled by mutual friction, are then behaving like a single classical viscous fluid. Observed values of both the critical velocity and the effective viscosity of the fully-coupled fluids are presented and discussed. It is suggested that the critical superfluid velocity is always closely similar to that expected classically for the coupled fluids, and a possible reason is discussed.

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