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C1Or2A-06: HECAL: A cryostat for calibration of hot wires

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The Laboratory SBT has studied Fundamental Turbulence at High Reynolds Number for many years. Indeed, low temperature Helium has such a low viscosity, that very high values of the so-called Reynolds number $Re=UL/\nu$ can be reached (U: velocity, L: characteristic scale of the flow, ν kinematic viscosity). These values allow to compare experiments with existing phenomenological descriptions of turbulence, which most often assume an infinite Reynolds number. Different experiments were performed [1-3], which allowed to study high Reynolds Number flows, and also to compare these (normal helium) turbulent flows with superfluid flows driven under the same conditions. These flows can be characterized with hot wire anemometry [4]. It was used in Hejet [2], but improvements in terms of spatial resolution and reliability are still under development. Moreover, the hot wires should be calibrated, which is not always possible in situ.

Therefore, we built a facility dedicated to the test and calibration of hot wires. In this paper, we describe this original cryostat. Indeed, instead of having a fixed hot wire in an incoming flow, which is the usual situation for hot wire calibration devices, the hot wire to calibrate is installed on a support part, which can be rotated in a fluid at rest. In order to calibrate the hot wires in the same velocity domain as in the SHREK and Hejet experiments, the support of the hot wire can reach velocities of a few meters per second. This calibration facility, called Hecal, is described and its first results will be presented.

[1] B. Rousset, et al, AIP Conf. Proc. 985, 633 (2008).

[2] D. Durì, et al, Review of Scientific Instruments 86, 025007 (2015).

[3] B. Rousset, et al, Rev. Sci. Instrum. 85, 103908 (2014).

[4] Bruun, "Hot-wire Anemometry: Principles and Signal Analysis", Oxford University Press, 1995.

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