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Abstract

We report preliminary results obtained using new local velocity probes in the Superfluid Helium high REynold number von Kármán flow (SHREK) experiment for different forcing conditions. The presentation will focus on the validation of the signals obtained from a hot-wire and a total head pressure tube in both normal and superfluid phases of liquid helium.

Besides global measurements[6] (torques and calorimetry), the experiment was designed to enable local measurements in the equatorial plane or next to the impellers. In the sequel, we present two new sensors, a Platinum-Rhodium hot wire...
and a new design of miniature Pitot anemometers, that were successfully operated in SHREK experiment to obtain local velocity measurements.

![Figure 2. Inter-correlation coefficient of a Pitot tube and a hot-wire signals obtained in He I (red diamonds) and He II (blue circles). Acquisitions performed in HeJet experiment [1]](image)

First we bring new insight in the understanding of the signal of hot-wires in He II (see [2]). In particular, we show that the inter-correlation coefficient of the signal of a hot-wire with the signal of a Pitot tube (for which the design can be found in [7]), is the same in He II as in He I where the signal can reliably be interpreted as a velocity (see Fig. 2). We also show preliminary velocity measurements obtained in SHREK using this kind of hot-wire.

Second, we report the first results obtained using novel miniature total head pressure tube (Pitot tube), obtained for a large range of rotation frequencies $f_1$ and $f_2$, in both normal and superfluid regime. The Pitot Helmholtz frequency is $\approx 450$ Hz giving useful bandwidth somewhat higher. The sensitivity is in the $10^{-7}$ m$^2$/s$^2$ range and can be further improved by combination of 2-amplifiers. The results are compared with results obtained in a scale 1:4 experiment, operated in Saclay with water [5].

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