WEDNESDAY, 30 NOVEMBER 2016

THE UNIVERSITY OF SHEFFIELD

3 PM – SIR FREDERICK MAPPIN BUILDING
LECTURE THEATRE 9

"Taylor's Hypothesis and Pressure from Particle Image Velocimetry"

Dr Roeland de Kat

Aerodynamics and Flight Mechanisms Research Group
Engineering and Environment
University of Southampton

Roeland obtained his engineering degree and doctorate in the Aerodynamics group at Aerospace Engineering, Delft University of Technology. In May 2011, he joined the University of Southampton to work on turbulent shear flows as a research fellow and, since May 2014, Roeland is a Leverhulme Trust Early Career Fellow and develops advanced flow diagnostic tools to further our understanding of feathered flight.

Taylor's hypothesis has since long been a useful tool in turbulence research. However, for shear flow it does not always hold and alternative techniques are required to pour time into space (or vice versa). Recently, I developed a data driven technique to overcome this short coming by using cross-spectra for frequency-wavenumber mappings (de Kat & Ganapathisubramani 2015).

Despite its limitations shear flow, Taylor's hypothesis is still widely used and can useful as an engineering tool. One recent use is in estimating pressure from particle image velocimetry (PIV). Using Taylor's hypothesis, the current state-of-the art techniques in pressure estimation techniques (e.g. de Kat & van Oudheusden 2012) can be simplified and time-resolved stereoscopic-PIV, snapshot tomographic-PIV, and even snapshot planar-

PIV can be used to estimate pressure in 3D convective turbulent flows (de Kat & Ganapathisubramani 2013, Laskari et al. 2016, de Kat et al. 2016).

References:

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de Kat R, Ganapathisubramani B (2013) Pressure from particle image velocimetry for convective flows: a Taylor's hypothesis approach. Meas Sci Technol 24:024002.

de Kat R, Laskari A, Van der Kindere J, Ganapathisubramani (2016) Pressure from 3D and 2D PIV snapshots in turbulent flows. NIOPLEX International Workshop on Non-Intrusive Optical Flow Diagnostics, 25-26 October, Delft, NL.

de Kat R, van Oudheusden BW (2012) Instantaneous planar pressure determination from PIV in turbulent flow. Exp Fluids 52:1089–1106.

Laskari A, de Kat R, Ganapathisubramani B (2016) Full-field pressure from snapshot and time- resolved volumetric PIV. Exp Fluids 57:44.