

distinguished speakers series

The Department of Mechanical and Materials Engineering presents:

Dr. Andrea Sciacchitano

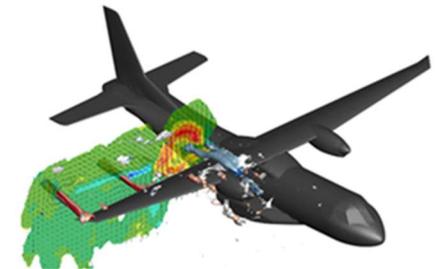
Aerospace Engineering, Delft University of Technology

Large Scale PIV: Challenges and opportunities for human-size flow measurements

Digital Particle Image Velocimetry (PIV) is nowadays the leading measurement technique for fluid dynamics investigation. Introduced over 25 years ago, the technique allows quantitative flow visualisations in planes or volumes. However, due to the limited illumination intensity and scattering efficiency of the tracer particles, the measurement volume has been long constrained to the order of a few cubic centimetres. The recent introduction of the sub-millimetre Helium-Filled Soap Bubbles (HFSB) flow tracers has increased the measurement domain up to the size of the cubic metres (large-scale PIV).

Nevertheless, the application of large-scale PIV to objects of complex shape (e.g. a cyclist, an aircraft in high-lift configuration...) has been hindered by requirements on optical access and by the complexity of the measurement system. Robotic volumetric PIV aims to overcome these limitations by using a compact arrangement of cameras and illumination. High versatility is achieved thanks to the fixed relative positions between the cameras, thus requiring no calibration when moving the system. Furthermore, the coaxial arrangement between illumination and imaging systems allows flow measurements even in regions accessible only from one viewing direction (coaxial volumetric velocimetry, CVV). In this talk, dr. Sciacchitano will present the principles of coaxial volumetric velocimetry and robotic PIV, discussing the main challenges and sources of measurement uncertainty, as well as the opportunities for three-dimensional quantitative flow visualisation and surface pressure reconstruction.

Dr. Andrea Sciacchitano is assistant professor at the faculty of Aerospace Engineering of Delft University of Technology, the Netherlands, from which he received his PhD in 2014. His research focuses on the development and application of quantitative flow visualisation techniques for aerodynamic measurements in wind tunnels and outside the lab environment.



TUESDAY, NOVEMBER 26TH – 9:00^{AM}, McLAUGHLIN HALL ROOM 312