25 Years of Particle Image Velocimetry in Aerodynamics.
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Use of PIV in Aeronautical Industry

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Abstract

The Experimental Aerodynamics at Airbus has been involved in Particle Image Velocimetry measurements since about 15 years. A lot of contributions were given in this time to make the method available for industrial testing in large wind tunnels. This was only possible thanks to the excellent cooperation with research institutes achieved during a considerable number of PIV projects. Garteur activities were the starting point followed by a number of national and European projects devoted to different aspects of more and more complex flows. In parallel to the ever increasing complexity of the flow, the requirements for the data accuracy were increased. The environment of industrial wind tunnel testing resulted in special developments of PIV hardware and software including a significant development of the testing efficiency.
A number of test campaigns is highlighted in the presentation. The spectrum covers a very first treatment of high lift phenomena via more sophisticated investigations of gap and trailing edge flows. The effect of model supports on the flow field around the model and wake vortex flows in air and water were further milestones. Measurements in the thin 3D-boundary layer of slightly vibrating big wind tunnel models provided excellent results even for industrial applications and under the disturbing effect of a still incomplete suppression of surface reflections. Last but not least, investigations of propellers were done by PIV using phase locking technique and Image Pattern Correlation Technique to determine the blade deformation of rotating model propellers.

The PROs and CONs to do PIV are given from an industrial point of view including some requirements to get further progress in the future.

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