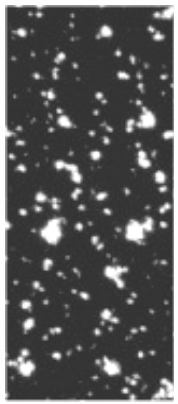
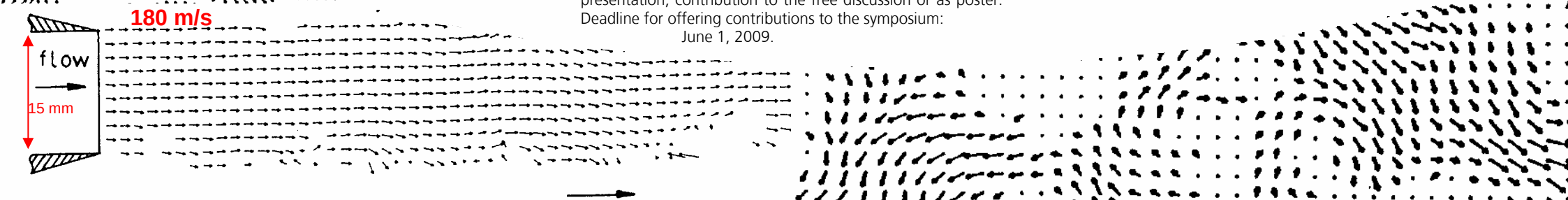
25 Years of Particle Image Velocimetry in Aerodynamics

Background

In summer 1984 teams of the University of Oldenburg and DLR carried out measurements of the instantaneous flow field by means of Particle Image Velocimetry for the first time in a wind tunnel of DLR Göttingen. In those days the recording of the PIV images had to be done photographically. Also, the evaluation of the recordings to obtain the displacement of the images of the tracer particles, added to the flow, had to be performed optically. A few months later DLR had the first double oscillator Nd:YAG laser at its disposal and started the development of a PIV system applicable for aerodynamic research in large industrial wind tunnels. Around 1995 a major breakthrough in the development of PIV, which has been a prerequisite to bring this technique out of the laboratory and into use at research organizations for applications of relevance to industry, has been made. Then, digital video cameras, allowing capturing the two frames of a PIV recording within a short time interval and with full spatial resolution became available. In the following decade the PIV technique has been widely spread and differentiated into many distinct applications ranging from micro flows to combustion and supersonic flows, both for research and industrial needs. This was made possible mainly due to further technological progress in video techniques, lasers and the development of sophisticated evaluation algorithms. In particular in Europe, the progress has been strongly accelerated in the field of aerodynamics by international cooperation of the leading PIV developers supported by European research grants. Nowadays the PIV technique is considered a 'validated tool' by the aeronautical industry and used in large industrial wind tunnels to support the design of new aircraft.



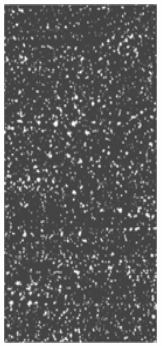


Objective

The twenty fifth return of the day when the first PIV measurements in a wind tunnel have been performed in Göttingen is considered to be a good opportunity to commemorate the early developments of the PIV technique and to contrast the technical possibilities of those days to the state-of-the-art of PIV today. Decisive inventions will be acknowledged at this occasion as well as many small but significant contributions to the development of the PIV technique, - made in the past two and a half decades by many researchers world wide. New users of the PIV technique, in most cases employing off-the-shelf commercial PIV systems, shall be familiarized with problems that had to be faced in the past due to inadequate technology of those days. In addition, as there are still documents (photos, PIV recordings, lab notes, etc.) available describing the research work from the early development of the PIV technique, it shall be discussed with experts in the field of the history of science whether an annotated compilation and archiving of such documents would be feasible.

Participation

In particular the symposium is aiming at the participation of 'pioneers' of the early days of PIV and of those scientists who provide major contributions to the state-of-the-art of PIV. Quite a few reckognized experts in the field from the US, Asia and Europe have already confirmed their interest in the symposium. More general, all persons who are interested to obtain a comprehensive overview of the history of PIV and the progress made at this technique within a time interval of 25 years are invited to attend this symposium.



Scientists who own interesting material related to the early developments of PIV or who can present state-of-the art applications of PIV which are of interest to a broader public are kindly requested to contact the organizers to find out whether their contribution can be considered for oral presentation, contribution to the free discussion or as poster. Deadline for offering contributions to the symposium:

June 1, 2009.

Schedule

Symposium

Wednesday, September 23, 2009

PIV history

- invited lectures
- free contributions
- posters
- discussion of historical aspects of PIV
- dinner

Chairman: Prof. Klaus Hinsch, University of Oldenburg

Thursday, September 24, 2009

PIV today

- lectures on state-of-the art PIV developments and applications
- posters
- future prospects of PIV
- visits of PIV laboratories and test facilities in Göttingen
- discussion

Chairman: Dr. Jürgen Kompenhans, DLR, Göttingen

Seminar

Friday, September 25, 2009

History of PIV

Discussion and planning of cooperative activities related to aspects of the history of PIV and general experiences made at the development of a new technology such as PIV.

Chairman: Dr. Falk Rieß, Center of Didactics and History of Physics, University of Oldenburg

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Documents

It is planned to collect documents (photos, diagrams, PIV recordings, text documents) related to the history of PIV. Owners of such documents are asked to send electronic copies of these documents to the organizer by e-mail: 25-years-PIV@dlr.de and to attach a text file with a short description of the contents of the documents and their full address.

It is planned to make this information available via the website of the symposium or by a CD ROM to be distributed after the symposium, including copies of the viewgraphs and posters as presented during the symposium as well.

Abstracts

After selection of contributions to the symposium all authors are asked to prepare an abstract of the contents of their presentation including their full address (max. length of abstract: one page). A compilation of the abstracts will be made available together with the final schedule via the website prior to the symposium. Deadline for submitting abstracts: August 1, 2009.

Oral presentations

After selection of oral contributions the authors will be asked to send an electronic copy of their presentation. This electronic copy will be made available via CD ROM or via the symposium website. Deadline for submitting electronic copies of presentations: t.b.a.

Posters

After selection of poster contributions the authors will be asked to prepare a poster according to a format made available via the website and to send an electronic copy of their poster. This electronic copy will be made available via CD ROM or via the symposium website. Deadline for submitting electronic copies of posters: t.b.a.

http://25-years-PIV.dlr.de 20090120

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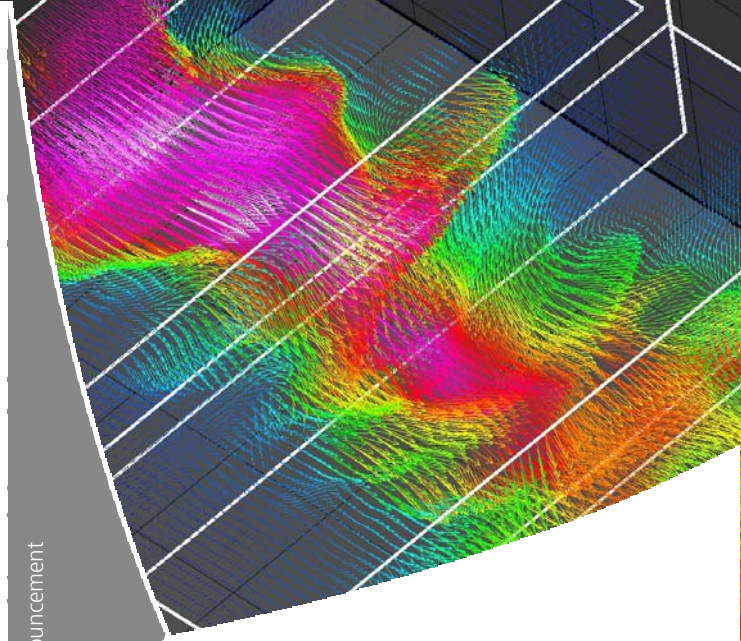

First Announcement

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DLR, Göttingen
Germany
September 23 – 25, 2009

DLR