Suggested Collaborative Research Projects

Syracuse University

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Syracuse University
College of Engineering and Computer Sciences

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Primary Topics

- Active Feedback Flow Control
- Bio Fluid Dynamics

- Active Control of Bluff-Body Wake

  (Lead: H. Higuchi)

Control of massively separated unsteady turbulent flow
over Axisymmetric, 3D and 2D geometries

(started at IFS, continued with students from IFS, Twente Univ.)

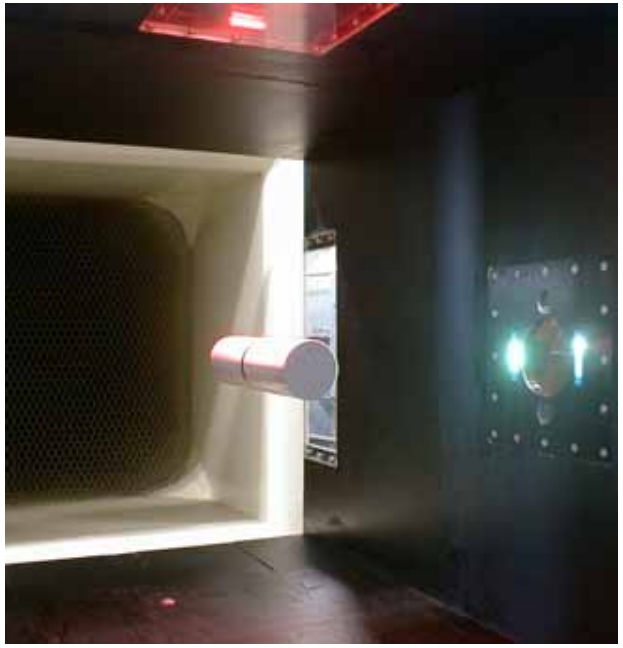
Collaborative Effort at IFS :

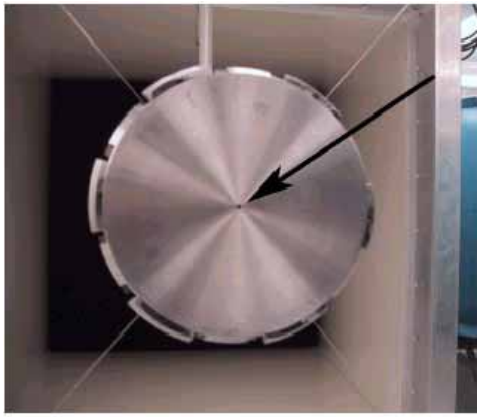
Coupled Experimental and Computational Study of Separated Flow (Prof. T. Hayase)

Collaborative Effort at JAXA:

(Dr. Sawada, Grant:Ministry of Education, etc.)

Mutually agreed collaboration with KTH





Pressure tap

Higuchi, et al 2004, 2005

- Active Feedback Control of Airfoil/Hydrofoil Flow Separation with Low-dimensional Modeling

  (Lead: M.N.Glauser, H.Higuchi)

- Active Control of Jet Noise in Anechoic Chamber

  (Lead: M.N.Glauser)

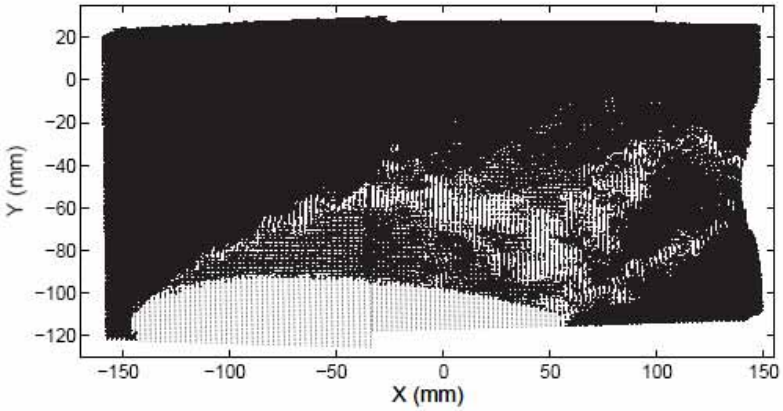


Figure 20. Instantaneous velocity vector map, $\alpha = 17.5^o$, Actuation OFF

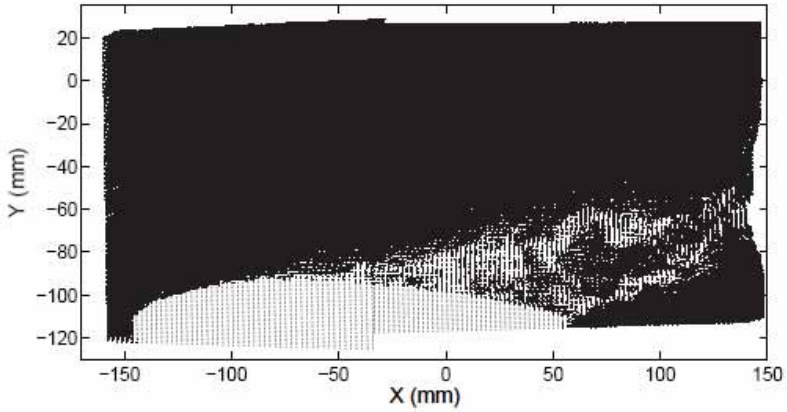


Figure 21. Instantaneous velocity vector map, $\alpha = 17.5^o$, Actuation ON

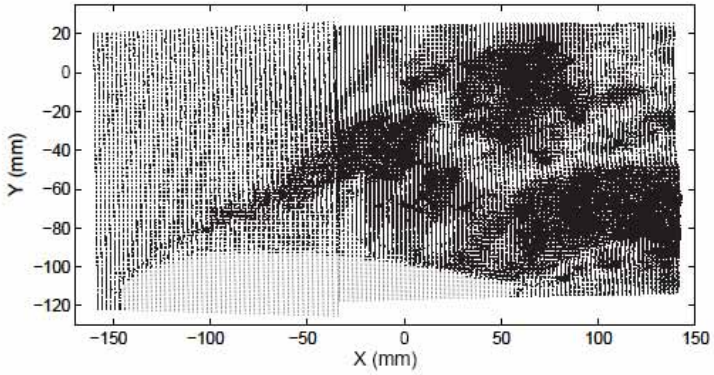


Figure 10. Linear velocity vector map estimation (mLSM) with all modes at $\alpha = 17.5^o$, t=567, Actuation OFF

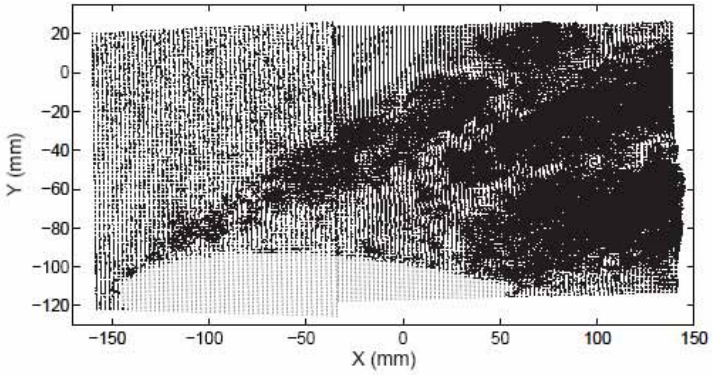


Figure 11. Quadratic velocity vector map estimation (mQSM) with all modes at $\alpha = 17.5^o$, t=567, Actuation OFF

“Sensor fusion"

Ongoing work with NASA Langley on aero vehicles

P. Varshney

Possible collaboration: UAV (Dr. Furukawa)
and Synthetic Jet: Univ. New South Wales

SU has significant capabilities in
electronic communications and intelligent systems.

Bio-Fluid Dynamics

- Experimental and analytical study of biofilm
- Numerical simulations of biofilm
- Flagellar propulsion
- Biomedical devices

Experimental and Analytical Studies on Biofilm
(Lead: D. Ren)

1. Effects of fluid dynamics on biofilm structure and biofilm detachment

2. Effects of fluid dynamics on the movement and attachment of individual free-swimming cells

3. Improve the understanding of biofilm drug resistance by considering changes in cell membrane

(possible collaboration: INSA Lyon)

Numerical simulations of biofilm and pattern formations in bacterial systems

(Lead: A. Sangani)

- to gain insights into how the interactions among bacteria lead to pattern and biofilm formations in multibacterial systems.
- The simulations incorporate essential properties of bacteria known from detailed investigations of single bacteria motion, e.g. their motion towards chemoattractants and their cell memory

Biomedical Devices
Ventricular Shunt
Knee Joint, etc.

with INSA Lyon, IFS, KTH

Additional Projects

- Indoor Built Environment
  - Micro Human Environment: (Higuchi, Glauser, Dang, Khaliffa)
    - Breathing, Coughing
    - Particulate suspension
  - Indoor Air Quality Modeling (Zhang)

    Possible Collaboration: Tohoku Architecture Dpt.
  - Environmental Chemistry:Particulate Nucleation, Growth, and Transport (Tavlarides, et al.)
  - Current collaborations: T.U. Denmark, Dresden, U.Tokyo, Tshinghua

Additional Projects (Cont'd)

(L. Tavlarides)

- Supercritical Fluid Technology
  - –Supercritical Diesel Fuel Combustion
  - –Remediation of PCB contaminated soils employing supercritical solvent extraction anddestruction of PCBs with supercritical water oxidation

- Chemical separations for nuclear waste applications

Wavelet Analysis and Turbulence (J. Lewalle)

•Wavelet processing of experimental/numerical data in many fields (paper formation, nerve response, turbulence):denoising, coherent structures, etc. (possible collaboration with KTH)

•Intermittent spectral transfer: wavelet based (i.e. spatial and spectral exchanges). Theoretical fluid dynamics.

How?

More Students from Tohoku University

Research Assistantship

Dual degree program is preferable.

More Students from Syracuse University.

University-wide agreement.

New Chancellor Nancy Cantor's Initiatives

Syracuse Division of International Programs Abroad

London, Madrid, Toulouse, Hon Kong, Beijing, etc.

Multilateral Research/Education Proposal Application

IFS, Tohoku University

Seed money for Flow Control Research

IFS(Hayase)-Syracuse University(Higuchi, Glauser)

-University of Poitiers (Bonnet)

NSF Proposal International Research and Education