

ERCOFTAC Symposium “Multiphysics critical flow dynamics involving moving/deformable structures with design applications”

7-9 June 2023, ENSEEIHT, Toulouse, France, Amphi B00

Keynote: 45 mn including questions
The oral presentations: 15 mn, including questions

Tuesday 6 June 2023:

17:00-19:00 *Early registration*

Wednesday 7 June 2023:

8:30 - 9:00 *Registration*

9:00 - 9:15 Welcome address by: M. Braza, M.V. Salvetti, I. Eames, Y. Hoarau

Session 1 : **Flow-Induced Vibrations**

9:15 - 10:00 **Raghuraman Govardhan**, Indian Institute of Science

Opening Lecture

Flexible surfaces in bluff body flows and flapping foils

10:00-10:45: **Chairperson:** Ian Eames

Instabilities in the wake of multiple freely-oscillating cylinders. Mouyen T., Sierra-Ausin J., Fabre D., Giannetti F.

Effects of angle of attack on the large-scale hyper-branch oscillations of a thin elliptical cylinder. Lo J.C.C., Thompson M.C., Hourigan K., Zhao J.

Implied energy harvesting from vortex-induced vibration of a circular cylinder with high mass ratios. Zhao J., Thompson M.C., Hourigan K.

10:40-11:00 *Brief coffee break*

11:00-11:45 **Jan-Bert Flór** CNRS, LEGI, Grenoble

Keynote

Interfaces between coherent vortex structures and turbulence

11:45-12:30: **Chairperson:** Yannick Hoarau

Drag coefficient of freely rolling short span cylinders. Nanayakkara S., Zhao J., Thompson M.C., Hourigan K.

Vortex forces on a cylinder from resonant wakes. Konstantinidis E.

Vortex structure formed in vicinity of wall on a heaving elastic airfoil. Fuchiwaki M.

12:30 - 13:55 *Lunch*

13:55 - 14:00 Welcome address in the amphi B00 by the Director of IMFT, Prof. Eric Climent

Session 2 : Oscillating/vibrating flows around bodies

14:00 - 14:45 Yahya Modarres - Sadeghi, University of Massachusetts Amherst, USA

Keynote Lecture

In the wake of a cylinder forced to rotate

14:45 -15:30: **Chairperson:** Horia Hangan

Galloping oscillations of an elastically mounted oblate spheroid. Cordero Obando A., Hourigan K., Thompson M.C., Zhao J.

Fluid-structure interactions on a pendular 3d bluff body. Myskiw A., Haffner Y., Paillé F., Borée J., Sicot C.

Numerical investigations of the laminar separation flutter for a spring-mounted airfoil. Sabino D., Fabre D., Marquet O., Mons V.

15:30 - 16:00 *Coffee break*

Session 3.I : Fluid-Structure Interaction and Morphing

16:00 -16:45 Michael Triantafyllou, Dept of Mech. Engineering, MIT, USA

Keynote Lecture

Morphing fins to dynamical alter the stability and manoeuvring properties of self-propelled vehicles

16:45 - 17:45: **Chairperson:** Henda Djeridi

Bio-inspired slotted wingtip with individually actuated, whippy winglets. Midmer A., Bruecker C.

Aerodynamics of flapping wings with passive and active deformation. Bouard F., Jardin T., David L.

Electroactive morphing effects through travelling wave actuation on the aerodynamic performance of a morphing wing by means of numerical simulation. El Akoury R., Marouf A., Kaleoglu., A Jimenez-Navarro C., Hoarau Y., Braza M.

Electroactive morphing effects on an A320 prototype in subsonic regime at Reynolds number of 1Million. Abou Khalil J., Carvalho M., Raibaudo C., Harran G., Cazin S., Marchal M., Bergame F., Ayroles H., Rouchon J.F., Braza M.

18:00: *Transportation by coach from ENSEEIHT to the Institute of Fluid Mechanics IMFT*

18:30-19:30 *Brief visit of IMFT's selected experimental facilities*

19:45 *"Cocktail dinatoire" at the restaurant Emulation Nautique near IMFT*

Thursday 8 June 2023:

Session 3.II. Fluid-structure interaction arising in aerodynamics

9:00 - 9:45 Denis Darracq, AIRBUS France.

Keynote Lecture

A flight physics perspective towards cleaner aviation

9:45 - 10:45: **Chairperson:** Yahya Modarres - Sadeghi

Fast unsteady method for nonlinear aeroelastic responses of flexible aircraft wings encountering wing gusts. Chandre-Vila O., Boin J-P., Nivet Y., Marquier S., Morlier J., Gourdain N.

Morphing of a high-lift wing-flap system with cambering and trailing-edge flapping at high Reynolds number towards a full airplane application. Marouf, A., Charbonnier, D., Gehri, A., Vos J.B., Rouchon, J.F., Hoarau, Y., Braza, M.

A high-lift wing-flap system and application of Active Flow Control to enhance the aerodynamic performances at high Reynolds number. Hoarau Y., Marouf A., Truong H.D., Gehri A., Charbonnier D., Vos J.B.

Morphing effects on the aerodynamic performance of an A320 type prototype, through frequency modulation (wobulation) in the vicinity of the trailing edge in subsonic regimes. Rouaix C., Jimenez-Navarro C., Marouf A., Carvalho M., Hangan H., Rouchon J.F., Braza, M.

10:45 - 11:15 *Coffee break*

Session 3.III Fluid-structure interaction arising in aerodynamics

11:15 - 12:00 Pawel Flaszynski, Institute of Fluid-Flow Machinery Polish Academy of Sciences – IMP-PAN, Poland

Keynote Lecture

Shock wave boundary layer interaction – mitigation of unsteady effects

12:00 - 12:45: **Chairperson:** Denis Darracq

Experimental characterization of (un)synchronized interactions between a normal shock-wave and compliant wall. Riveiro Moreno C., Couliou M., Fabbiane N., Marquet O., Bur R.

Numerical simulation of the aerodynamic performance of a morphing wing in the transonic regime. Jimenez-Navarro C., Rouaix C., El Akoury, R., Marouf A., Hoarau Y., Braza M.

Aerodynamic performance increase in transonic flow over an A320 morphing wing by numerical simulation at high Reynolds number. Abou-Khalil, J., Jimenez-Navarro, C., El Jaaid, R., Marouf, A., El Akoury, R., Hoarau, Y., Farges, J.L., Chaboud, T., Louge, T., Rouchon, J.F., Braza, M.

12:45 - 14:15 *Lunch*

14:15 - 15:00 Alessandro Bottaro, Scuola Politecnica, University of Genova, Italy

Keynote Lecture

Passive turbulent drag reduction with anisotropic porous substrates

15:00 - 15:45: **Chairperson:** Christoph Bruecker

On the potential of drag reduction using morphing bluff-bodies for ground vehicle application. Fan Yajun, Fichera Sebastiano, Cadot Olivier, Parezanović Vladimir

Experimental study on the use of rear deformable devices to reduce drag of a squareback Ahmed body. Muñoz-Hervás J.C., Camacho-Sánchez J.M., Lorite-Díez M., Jiménez-González J.I., Cadot O., Martínez-Bazán C.

Aerodynamic drag reduction of an Ahmed vehicle model based on artificial intelligence control. Bingfu Zhang, Dewei Fan, Yukuan Song, Yu Zhou

15:45 - 16:15 *Coffee break*

16:15 - 17:00 **Patricia Ern** CNRS, Institut de Mécanique des Fluides de Toulouse

Keynote

On deformable bodies freely rising or falling in fluid at rest at moderate Reynolds numbers

17:00 - 18:00: **Chairperson:** Alessandro Bottaro

Vortex shedding patterns on freely falling flat plates. Lorite-Díez M., Cazin S., Durán-Venegas E., Ern P.

Drag increase of a falling sphere induced by rear-side filaments. Seungho Choi, Minhyeong Lee, Daegyoun Kim

Intrinsic features of flow-induced stability of square cylinder. Lin C., Alam M.M.

Fluid-structure interaction and control of a flexible wing in crosswind. Si Peng & Yu Zhou

Session 4 **Fluid-Structure Interaction and atmospheric conditions - I**

Chairperson: Yu Zhou

18:00 – 18:45 **Horia Hangan**, Ontario Tech University, Canada

Keynote Lecture

Dynamics of non-synoptic winds and their impact on structures

20:00 : *Gala dinner at the Brasserie des Beaux Arts at Pont Neuf*

Friday 9 June 2023

Session 4 Fluid-Structure Interaction and atmospheric conditions - II

9:25-10:30: **Chairperson:** Yu Zhou

Interaction of surface-based features and extreme winds. Lombardo Franklin T.

Towards bio-inspired wings robust to atmospheric perturbations. Achirica Villameriel A., Martinez Sanchez A., Doué N., Ferrand V., Gowree E.R.

On the interaction between physically produced downbursts and atmospheric boundary layer winds. Canepa F., Hangan H., Burlando M., Romanic D.

Torsional-flutter energy harvesting under non-synoptic thunderstorm-like turbulence. Caracoglia L.

10:30-11:00 *Coffee break*

11:00 - 11:45 Takashi Ishihara, Okayama University, Japan

Keynote Lecture

Vortical structures in high Reynolds number turbulence - clues from DNS results

11:45-12:30: **Chairperson:** Yannick Hoarau

On the role of thermal critical layers in the structure response of pipes. Ian Eames, Adam Wojcik, Mike Austin

Numerical simulation for a fluid-structure interaction problem. Boyer Franck, Fournié Michel, Gajardo Diego

Non-intrusive model order reduction for fluid-structure interaction problems. Tiba A., Berro Ramirez J.P., Dairay T., De Vuyst F., Mortazavi I.

12:30-14:00 *Lunch*

Session 5 Fluid-Structure Interaction and Control

14:00-14:45 Yu Zhou, Center for Turbulence Control, Harbin Institute of Technology, China

Keynote Lecture

Active drag reduction of a turbulent boundary layer from low to high Reynolds numbers

14:45 - 15:30: **Chairperson:** Raghuraman Govardan

A hybrid-AI-controlled turbulent jet and scaling of various Reynolds numbers. Wu Z., Perkumal A.K., FAN D.W., Zhou Y.

Machine learning approach POD-LSTM and reconstruction towards reduced order modelling for fluid-structure interaction under turbulence. Marouf, A., Braza, M., Lampert, T., El Akoury, R., Hoarau, Y.

Towards real-time flutter modeling. Lacazedieu, E.

15:30-16:00 *Coffee break*

16:00-16:45 **Atef Mohany**, Ontario Tech University, Canada

Keynote Lecture

Flow-Sound Interaction Mechanisms: Fundamental Aspects and Control Strategies

16:45-17:45 : **Chairperson:** Elisabeth Lacazedieu

Fluid Structure Interaction in the annular gap of a nuclear reactor vessel: design of a test rig. Kocher M., Moussou P., Joly A., Benhamadouche S., Panunzio D., Lagrange R.

On the free vibration of a circular array of elastically mounted cylinders. Kunhee Lee, Eames Ian.

Ramp flow separation control based on spanwise pulsed slot jet. Fan D.W., Zhang B.F., Shen L., Zhou Y.

Rearrangement of a bio-inspired poroelastic cluster under fluid flow. Minhyeong Lee, Ehsan Mahravan, Daegyoun Kim

17:45 - 18:00 Closing address and refreshments for the departure