

PROGRAMME

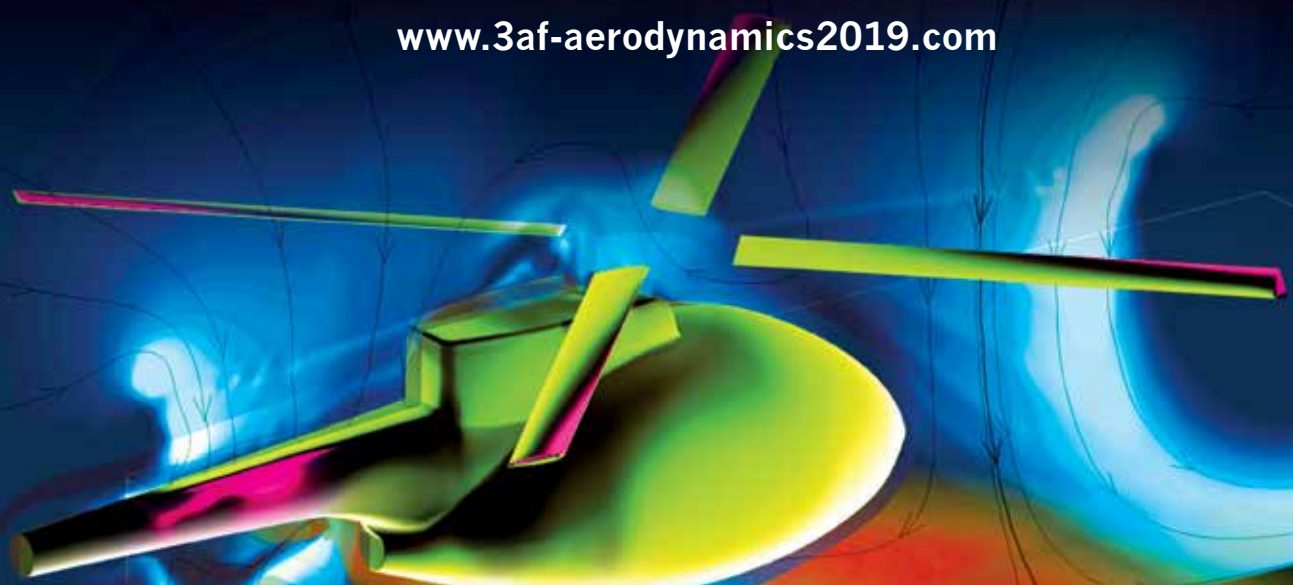


Association Aéronautique
et Astronautique de France

54th 3AF International Conference
on Applied Aerodynamics
Aerodynamics at
off-design conditions

Paris, March 25-26-27, 2019

www.3af-aerodynamics2019.com



Helicopter close to the ground © ONERA

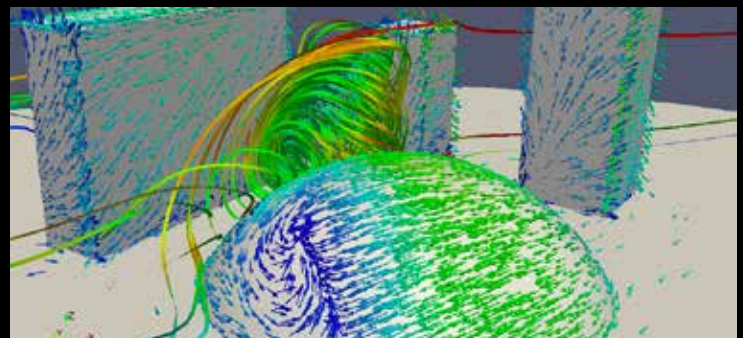
le cnam



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Abderrahmane **BAÏRI**
Emmanuel **BÉNARD**
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ISAE-ENSMA (retired)
Safran Aircraft Engines
University of Cambridge
University of Paris West
ISAE-SUPAERO
University of Poitiers
ISAE-ENSMA
IMFT
ArianeGroup
Safran Aircraft Engines
ISAE-SUPAERO
ONERA
ONERA
Airbus
ONERA
Arts et Métiers ParisTech
ArianeGroup
Ecole Centrale-Lyon
ONERA
ISAE-SUPAERO
Airbus
3AF & ONERA (retired)
University of Orléans
Polish Academy of Sciences
Safran Aircraft Engines
ISAE-SUPAERO
ONERA
MBDA
3AF & Renault (retired)
ISL
ISAE-SUPAERO
IAT-Cnam
PSA Peugeot Citroën
University of Strasbourg
Ecole Centrale-Lyon
DGA
A-NSE
University of Orléans
CNRS
CNES
3AF
ArianeGroup
MBDA
Nammo Ireland
Safran Aircraft Engines
University of Aix-Marseille
Dassault Aviation (retired)
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54th 3AF International Conference
on Applied Aerodynamics
Aerodynamics at
off-design conditions
Paris, March 25-26-27, 2019



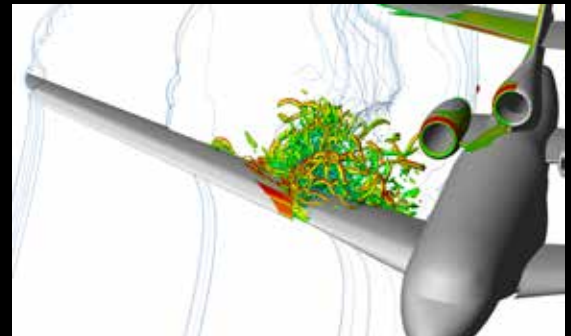
Wind effect on urban site © CSTB

Aerodynamics at off-design conditions

The 3AF International Conference on Applied Aerodynamics is organized each year by the French Aeronautics and Aerospace Society (3AF) in a different venue in France known for its activities in the field of aeronautics and/or space technology. The conference is an excellent opportunity for scientific exchanges within the aerospace community where aerodynamicists from industry, research institutions and academics meet. Scientists and engineers from other fields involving fluid mechanics are also welcome.

Every year the conference addresses a different topic trending in the field of aerodynamics. It is organized on the basis of five half-days of technical presentations, each introduced by a keynote conference given by a highly recognized expert in the field covered during the session. The conference is concluded by a technical visit in connection with the conference subject.

In 2019, the conference will be hosted by the Conservatoire National des Arts et Métiers (Cnam) in Paris. This 54th 3AF International Conference on Applied Aerodynamics focuses on **complex flow behaviour at off-design conditions**, which may or may not be planned. This includes conditions on the edge of the flight envelope: **high speed/altitude/AoA as well as take-off and landing conditions**. The design of **aircraft and rotorcraft** is bound to take into account those cases, where the system endures high constraints. Similarly, **terrestrial vehicles** are designed to withstand tunnel and overtaking effects, and **spacecraft** to withstand atmospheric entry. Unexpected conditions may also appear when the flight envelope is overreached for instance. **Weather and environmental conditions** may be unpredictable and particularly harsh: gusts and crosswinds may make take-off and landing harder or even prevent them; **icing conditions** are a source of incidents or accidents, as well as **sand and bird ingestion, foreign objects, sand, volcanic ash**. All these conditions are source of risks and imply complex phenomena which are challenging for CFD as well as experimental and theoretical studies. A deeper knowledge of such extreme conditions is thus crucial to avoid undesirable or catastrophic events, despite the complexity of the flow phenomena which presents serious challenges to the traditional experimental, theoretical and numerical analysis.



Slat extremity vortex © ONERA

Programme overview

MONDAY, MARCH 25, 2019

- 08:00 Registration/Welcome coffee
- 09:00 Conference Welcome
- 09:30 Keynote Conference n°1: Jean-Paul Bouchet (CSTB - Scientific and Technical Center for Building)
- 10:15 Session n°1a: Icing and wakes / Session n°1b: CFD Methodology / Session n°1c: Spinning bodies
- 14:15 Keynote Conference n°2: David Alfano (Airbus Helicopters)
- 15:00 Session n°2a: Helicopters / Session n°2b: Stall
- 19:30 Awards of the 3AF International Conference on Applied Aerodynamics and Banquet

TUESDAY, MARCH 26, 2019

- 09:00 Keynote Conference n°3: Eric Coustols (ONERA)
- 09:45 Session n°3a: Buffet / Session n°3b: Wind turbines / Session n°3c: Hypersonic flows
- 14:15 Keynote Conference n°4: Jeffrey P. Slotnick (Boeing Company) - Gerd Heller (Airbus Operations)
- 15:30 Session n°4a: Low speed, high lift configuration / Session n°4b: Supersonic flows / Session n°4c: Flow control on wing

WEDNESDAY, MARCH 27, 2019

- 09:00 Keynote Conference n°5: Nicolas de Cacqueray (Safran Aircraft Engines)
- 09:45 Session n°5a: Turbomachinery / Session n°5b: Shock-wave/Boundary-layer interaction
- 14:30 Technical visits



CONFERENCE LOCATION:

Conservatoire National
des Arts et Métiers (Cnam)

292 rue Saint Martin
75003 PARIS

ORGANIZATION:



le cnam

ROOM 1

08:00 REGISTRATION/WELCOME COFFEE

09:00 CONFERENCE WELCOME

Michel Scheller (President, French Aeronautics and Astronautics Society)
Olivier Faron (Cnam General Administrator)

09:30 KEYNOTE CONFERENCE N°1:

Wind tunnel simulations of vehicles in severe climatic conditions: related techniques and issues
Jean-Paul Bouchet (CSTB - Scientific and Technical Center for Building)

ROOM 1 ROOM 2 ROOM 3

10:15 **Session n°1a:
Icing and wakes**

*Chairperson: Iraj Mortazavi
(Cnam)*

10:15 **Session n°1b:
CFD Methodology**

*Chairperson: Pierre Sagaut
(Aix-Marseille University)*

10:15 **Session n°1c:
Spinning bodies**

*Chairperson: Patrick Gnemmi
(ISL)*

10:20 **Ice accretion numerical simulation
using discrete approach**

*K. Szilder
(National Research Council)*

10:20 **Towards real-time aerodynamic
simulations**

*D. Placko, S. Gourlaouen,
A. Rivollet and J.-P. Barbot
(SATIE-ENS Laboratory/
FTSC Company)*

10:20 **Numerical and experimental
investigation of a 3-axis free
rotation model**

*L. Muller, M. Libsig, Y. Bailly
and J.-C. Roy
(ISL/UBFC & FEMTO-ST Institute)*

10:50 **Quasi-3D multi-layer ice accretion
model using a Vortex Lattice
Method combined with 2.5D RANS
solutions**

*S. Bourgault-Côté, M. Parenteau
and É. Laurendeau
(Polytechnique Montréal)*

10:50 **Lattice-Boltzmann simulations at
the corners of the flight envelope**

*B. König and E. Fares
(Dassault Systèmes – SIMULIA)*

10:50 **Magnus effects for roll-decoupled
canards on a spinning body of
revolution**

D. Klatt and A. Mielke (ISL)

11:20 COFFEE BREAK

11:50 **Experimental sensitivity analyses
of steady and periodic modes to
continuous blowing at the base of a
3D bluff body**

*M. Lorite-Díez, J. I. Jiménez-
González, C. Martínez-Bazán,
L. Pastur and O. Cadot
(Universidad de Jaén/ ENSTA
ParisTech/ University of Liverpool)*

11:50 **LBM code development and its
application to a high-lift device
with high angle of attack conditions**

Takashi Ishida (JAXA)

11:50 **Base pressure of spinning finned
afterbodies at Mach 3.0**

*S. Weidner, R. Hruschka and
H. Albers (ISL)*

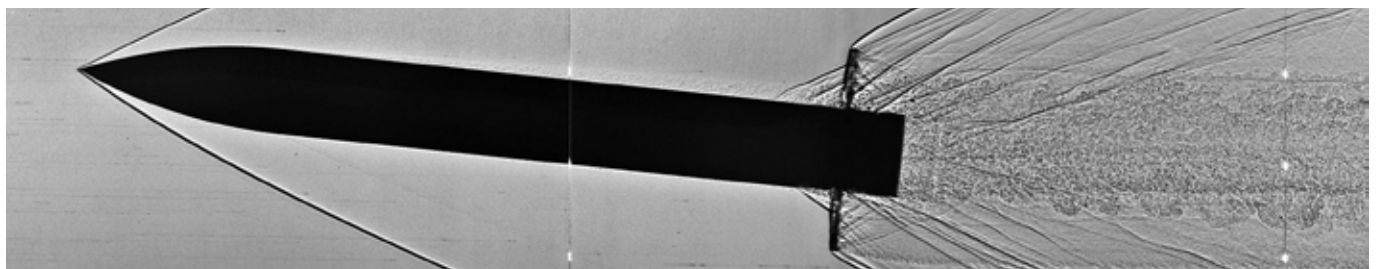
12:20 **Gust load prediction using unsteady
flow simulations**

*B. Duda and U. Batir
(Dassault Systèmes/Technical
University Munich)*

12:20 **Flow physics and dynamic mechanism
of un-commanded lateral-directional
motions at transonic condition**

*Ke Xie and Qing Shen (China Academy
of Aerospace Aerodynamics)*

12h50 LUNCH



ROOM 1

14:15 **KEYNOTE CONFERENCE N°2:**
The RACER high speed helicopter demonstrator : some challenges in aeromechanics
David Alfano (Airbus Helicopters)

ROOM 1 ROOM 2

15:00 **Session n°2a:**
Helicopters
Chairperson: Arnaud Le Pape (ONERA)

15:00 **Session n°2b:**
Stall
Chairperson: Eric Laurendeau (Polytechnique Montréal)

15:10 **Spectral Galerkin method for rotor induced velocity modelling**
R. Perret, P.-M. Basset and J.-M. Moschetta (ONERA/ISAE-SUPAERO)

Incipient stall characterization from skin friction maps
M. Miozzi, C. Klein, F. Di Felice and M. Costantini (CNR-INM/DLR)

15:40 **On the evaluation of the brownout of helicopter in ground effect using CFD simulations**
G. Dubot, R. Millet and M. Henneton (DGA Aero-engine Testing)

Numerical simulations and global stability analyses of transonic buffet and subsonic stall
F. Plante, J. Dandois, S. Beneddine, D. Sipp and E. Laurendeau (ONERA/Polytechnique Montreal)

16:10 **Modelling of aerodynamics for prediction of stall behaviour - Experimental and numerical approaches**
D. Farcy, J.-F. Le Roy and D. Keller (ONERA/DLR)

16:40 COFFEE BREAK

17:10 **An analytical model for propeller aerodynamic efforts at high incidence**
Y. Leng, J.-M. Moschetta, T. Jardin and M. Bronz (ISAE-SUPAERO/Delair/ENAC)

Numerical investigation of the aerodynamic behavior of a generic light aircraft
D. Keller, D. Farcy and J.-F. Le Roy (DLR/ONERA)

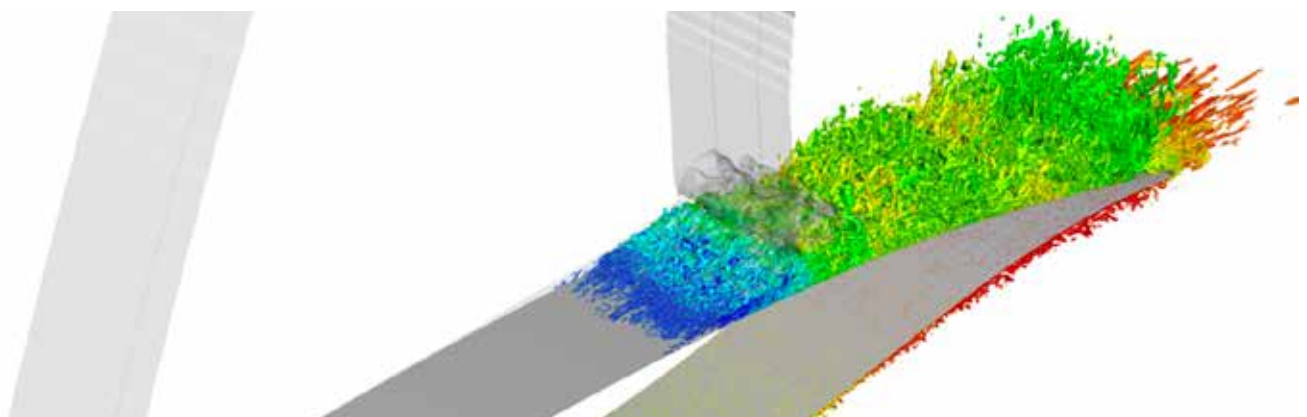
17:40 **Flow conditions downstream of a turbofan propulsion simulator fan stage – an experimental parametric study**
M. Berens (Airbus Operations GmbH)

Civil aircraft wind tunnel feature rich testing at the edge of the envelope
A. Mann, G. Thompson and P. White (Airbus Operations Ltd)

18:10 **Wind tunnel correlation studies and characteristics of the experimental aircraft Acs-Loong**
B. Peruchi Trevisan, M. da Silva e Souza, R. Galdino da Silva and A. Zaramella (Instituto de Aeronáutica e Espaço/Advanced Composite Solution Aviation)

18:40 END OF SESSION

19:30 AWARDS AND BANQUET



ROOM 1

08:00 REGISTRATION/WELCOME COFFEE

09:00 KEYNOTE CONFERENCE N°3:

Overview of European activities on buffet onset and control*Eric Coustols (ONERA)*

ROOM 1

ROOM 2

ROOM 3

09:45

**Session n°3a:
Buffet***Chairperson: Zdenek Johan
(Dassault Aviation)***Session n°3b:
Wind turbines***Chairperson: Annie Leroy
(University of Orléans)***Session n°3c:
Hypersonic flows***Chairperson: Francesco Grasso
(Cnam-Paris)*

09:50

**Comparisons flight test, CFD/
CSM for high loaded steady turn
manoeuvres***J.-P. Boin, B. Nahmias
and B. Barriety
(Airbus Commercial Aircraft)***Assessment of stress blended
eddy simulation model and grid
topologies for accurate prediction
of three-straight-bladed vertical
axis wind turbine performance***T.P. Syawitri, Y.F. Yao, J. Yao and B.
Chandra (University of the West of
England/Universitas Muhammadiyah
Surakarta/University of Lincoln)***Stability of a cooled hypersonic
boundary layer: nonlinear
resonance points among waves
with high frequency ratio***Y. Ide and K. Ito (JAXA)*

10:20

**Simulation of transonic buffet at
the common research model with
an automated Zonal Detached
Eddy Simulation approach***M. C. Ehrle, A. Waldmann,
T. Lutz and E. Krämer
(University of Stuttgart)***Investigation of performance
of small wind turbine blades with
winglets***M. Kulak, M. Lipian
and K. Zawadzki
(Lodz University of Technology)***Experimental investigation of
rarefaction effects on aerodynamic
coefficients of slender and blunt re-
entry vehicles at low and high angles
of attack***T. Schlegat and K. Hannemann (DLR)*

10:50

**System identification on 2D
transonic buffet***A. Sansica, J.-Ch. Loiseau,
M. Kanamori, J.-Ch. Robinet
and A. Hashimoto
(JAXA /DynFluid Laboratory)*

11:20

COFFEE BREAK

11:50

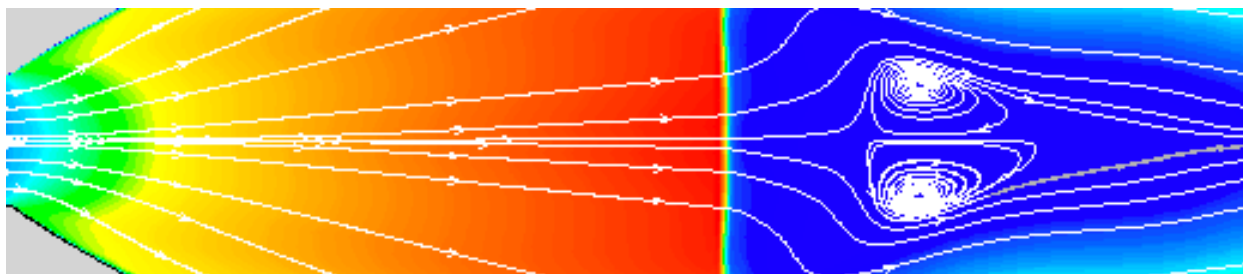
**Transonic buffet control by means
of upper Gurney flaps***A. D'Aguzzo, F.F.J. Schrijer
and B.W. van Oudheusden
(Delft University of Technology)***Vortex exergy prediction***M. Á. Aguirre, S. Duplaa and
X. Carbonneau (ISAE-SUPAERO)*

12:20

**2.5D LES simulation of an airfoil
shock wave reduction by using
porous media***I. Mălăeșel, I. O. Bucur and V. Drăgan
(COMOTI-Bucharest)***Interaction of wing tip vortices by
coupling of two NACA0021 profiles***T. Grund, M. Staats, D. Kiedacz
and J. Weiss (TU Berlin)*

12:50

LUNCH



ROOM 1

14:15

KEYNOTE CONFERENCE N°4:**Emerging opportunities for predictive CFD for off-design commercial airplane flight characteristics**

Jeffrey P. Slotnick (Boeing Company)
Gerd Heller (Airbus Operations)

ROOM 1

ROOM 2

ROOM 3

15:00

**Session n°4a:
Low speed, high lift
configuration**

*Chairperson: Alan Mann
(Airbus Operations Ltd)*

**Session n°4b:
Supersonic flows**

*Chairperson: Paul Bruce
(Imperial College of London)*

**Session n°4c:
Flow control on wing**

*Chairperson: Jean-Christophe
Robinet (ENSAM)*

15:10

**High fidelity design of the
AVACON research baseline aircraft
based on CPCAS data set**

F. Lange (DLR)

**High-speed streamwise corner
flows**

*K. Sabnis and H. Babinsky
(University of Cambridge)*

**Active control of transient loads
on a trailing edge separated NACA
0015 airfoil**

*A. Carusone, C. Sicot, J.-P. Bonnet
and J. Borée (Pprime Institute)*

15:40

**Active control of wing-engine-slat-
cut-out region flow separation**

*M. Possti, A. Yaniv, J. Ullah
and A. Seifert
(Tel-Aviv University/IAG Stuttgart)*

**Numerical investigation of the
unsteady transition between
asymmetric shock systems**

*L. Laguarda Sanchez, S. Hickel,
F.F.J. Schrijer and
B.W. van Oudheusden
(Delft University of Technology)*

**Optimization of parameters
of tangential jet blowing on
transonic airfoil**

*K.A. Abramova and V.G. Soudakov
(TsAGI)*

16:10

**Reynolds number and wind tunnel
wall effects on the flow field
around a generic UHBR engine
high-lift configuration**

*J. Ullah, A. Prachař, M. Šmíd,
A. Seifert, V. Soudakov, T. Lutz
and E. Krämer (University of
Stuttgart/ Aerospace Research and
Test Establishment-Prague/Tel Aviv
University/TsAGI)*

**Experimental study of symmetric and
asymmetric shock-shock interactions
with variable inflow Mach numbers**

*J. Santiago Patterson, L. Laguarda
Sanchez, F.F.J. Schrijer, B.W. van
Oudheusden and S. Hickel
(Delft University of Technology)*

**Effects of off-design flap gap and
overlap sizes on the performance
of a Fowler flap**

*D. Bellamy and M. Ferchichi
(Royal Military College of Canada)*

16:40

COFFEE BREAK

17:10

**Experimental and CFD study
of Krueger flaps**

*R. Kulhánek, Z. Pátek and
P. Vrchoťa (Czech Aerospace
Research Centre)*

**Linear and non-linear aspects
of screech dynamics in supersonic
jets**

*M. Mancinelli, V. Jaunet,
P. Jordan, A. Towne and S. Girard
(Pprime Institute/CNES/University
of Michigan)*

**Numerical and experimental
investigation of frequency and
amplitude effects of a morphing wing
in one/two element configurations at
high Reynolds number**

*A. Marouf, Y. Bmegaptche Tekap,
N. Simiriotis, Y. Hoarau and
M. Braza (ICUBE Laboratory/IMFT)*

17:40

**Installed jet at take-off conditions:
the effect of the external boundary
layer thickness on aerodynamics
and aeroacoustic**

*F. Sartor, F. Gand and T. Le Garrec
(ONERA)*

**Flow Response to Rapid Morphing
Flap Deflection**

*C. Abdessemed, Y. Yao,
A. Bouferrouk and P. Narayan
(University of the West of England)*

18:10

**Experimental study of ground
effect on the aerodynamic
characteristics of twin-engine
STOL transport aircraft**

E. Pigusov (TsAGI)

**Effect of Leading Edge Blowing for
Aerofoil Subjected to Laminar and
Turbulent Inflows at Low Reynolds
Numbers**

*Y. Al-Okbi, T. Pei Chong
and S. M. Hasheminejad
(Brunel University London)*

18:40

END OF SESSION

ROOM 1

08:00 REGISTRATION/WELCOME COFFEE

09:00 **KEYNOTE CONFERENCE N° 5:**
Fan blade aeroelasticity: future challenges for engine manufacturers
Nicolas de Cacqueray (Safran Aircraft Engines)

ROOM 1 ROOM 2

09:45 **Session n°5a:**
Turbomachinery
Chairperson: Michael Schvallinger (Safran Aircraft Engines)

Session n°5b:
**Shock-wave/
 Boundary-layer interaction**
Chairperson: Jean-Paul Dussauge (Aix-Marseille University)

09:50 **Coherent vortex structures over a rotating spinner under non-axial inflows at low Reynolds number**
S. Tambe, F. Schrijer, A. G. Rao and L. Veldhuis (Delft University of Technology)

Control of shock-wave/turbulent boundary-layer interaction using herringbone riblets
B. Wen, G. Wang, P. Quan and S. Zhong (University of Manchester)

10:20 **Mitigate shock waves in a centrifugal compressor using perforated airfoils**
B. Gherman, O. Dumitrescu and V. Drăgan (COMOTI-Bucharest)

Shock wave/boundary layer interaction in a transitional flow over a backward-facing step
W. Hu, S. Hickel and B.van Oudheusden (Delft University of Technology)

10:50 **Transonic shock wave boundary layer interaction over an aerofoil-like bump**
Z. Sun, X. Miao and C. Jagadeesh (City, University of London)

11:20 COFFEE BREAK

11:50 **Design optimisation of circumferential casing groove for stall margin improvement in a transonic compressor rotor**
A.F. Mustafa and V. Kanjirakkad (University of Sussex)

Experimental and numerical study of 2D adaptive shock control bumps
M. Gramola, P. Bruce and M. Santer (Imperial College London)

12:20 **Aerodynamic performance of chevron geometry trailing edge for a transonic axial compressor impeller**
I. O. Bucur, I. Mălăeş and V. Drăgan (COMOTI-Bucharest)

Impact of surface roughness location on aero-engine intakes at incidence
C. Coles, H. Babinsky and C. Sheaf (University of Cambridge/Rolls Royce Plc.)

12:50 **CFD evaluation of a new centrifugal pump concept for rocket propulsion**
I. Mălăeş and I.O. Bucur (COMOTI-Bucharest)

Optimization of a fluidic 3D control in a transonic channel flow
Q. Chanzy, E. Garnier and R. Bur (ONERA)

13:20 LUNCH

14:30 TECHNICAL VISIT

16:00 END OF AERO2019



S10 Wind Tunnel © IAT Cnam



S6 Wind Tunnel © IAT Cnam

The Conference will take place in the **Conservatoire National des Arts et Métiers (Cnam)**

Getting to Conference Location

Conservatoire National des Arts et Métiers (Cnam)
292, Rue Saint Martin
75003 Paris, France

As the Cnam is a large building, please be sure to take the correct entrance on Rue Saint Martin.

Access by public transportation

The Cnam is located in 3rd Arrondissement, in the heart of Paris, so it can properly be reached by public transportation.

The closer subway station is Strasbourg Saint Denis on metro line 4, 8 or 9.



For more information, please visit www.ratp.fr/en

Access by car

Several parkings are located around the Cnam:

Parking Saint-Martin	254, Rue Saint-Martin
Parking Beaubourg	31, Rue Beaubourg
Parc Sébastopol	43 b, Boulevard Sébastopol



Technical visits are scheduled on Wednesday, March 27 from 14:30 to 16:00

Please be aware that you have to be registered in order to participate in the technical visit.

Institut Aérotechnique (IAT) 15, Rue Marat – 78210 SAINT-CYR-L'ECOLE

Created in 1909 by a donation from Henry Deutsch de la Meurthe, the AeroTechnic Institute (IAT) was inaugurated July 6, 1911 to pursue theoretical and practical researches aimed at development of aerial locomotions.

With its experience in aerodynamics in more than a century, the IAT provides large test facilities in industrial aerodynamics and related sciences.

The main activities concern the following sectors: Aeronautics, Automotive, Wind power, Rail, Civil engineering.

The wind tunnels, the test benches and other means allow to perform industrial and/or research services.

This technical visit will be the opportunity to discover the following wind tunnels:

S10 Wind Tunnel

The S10 wind tunnel has a closed circuit with a rectangular test section 5m wide, 3m high and 10m long and slotted walls. The maximum velocity in the test section is 55 m/s.

The facility is equipped with a turntable of 4.34m diameter, a boundary layer control system, a 6-component external balance for automotive aerodynamics tests, and 6-component internal balances used with sting and mast model supports for aeronautical tests.

The wind tunnel is also equipped with water injection ramps for dirt and wiping studies, hot wire anemometry, mechanical and miniature electronic pressure scanners, high-speed digital data acquisition system (216kHz synchronous multichannel DAQ system) and unsteady pressure transducers.

S6 Wind Tunnel

The main use of the S6 wind tunnel is for aerothermal studies.

The wind tunnel has a rectangular test section of adjustable width of 4 to 6m (movable side walls), a height of 6m and a length of 17m. The maximum velocity in the test section is 20 m/s.

The facility is equipped with a chassis dynamometer for road simulation tests (endurance of alternators, cooling of braking systems), and a gantry crane equipped with 180 infrared lamps (delivering 1.2kW/m²) to reproduce temperatures up to 55°C in the test chamber.

CONFERENCE VENUE

Conservatoire National des Arts et Métiers (Cnam) 292 rue Saint Martin 75003 PARIS

LANGUAGE

Official language for the conference is English.

REGISTRATION

Delegates including Chairpersons and Speakers are requested to register and settle registration fees prior the Conference. Access to technical visit is controlled for security reasons.

Registration fees include: Conference session attendance, Conference documentation, coffee breaks, lunches, banquet on Monday, March 25, 2019, access to the technical visit and Conference proceedings.

All prices quoted are in EURO. Registration fees not subject to VAT.

3AF Individual Member	€ 650.00
Speaker/Chairperson	€ 650.00
Participant	€ 900.00
Academics/Student/PhD	€ 400.00
Additional conference banquet ticket for accompanying person	€ 60.00

REGISTRATION FORM AND PAYMENT

On line registration on: <http://3af-aero2019.eventium.net>

Complete online form and follow payment indication. Upon receipt of your payment an invoice and a recipe will be sent. These are to be shown at the Conference Welcome Desk.

CANCELLATION POLICY

At less than 7 days from the conference, a € 350 cancellation fee will apply to Participant, Speaker and Chairperson, € 250 to Academics / Student / PhD.

Delegates who do not cancel before the start of the conference will be liable to the full registration fee.

PUBLICATION

Authors of the best papers will be invited current April to propose an extension of their works for publication in a special issue of the International Journal of Numerical Methods for Heat & Fluid Flow* dedicated to the conference. These extended versions must be original, written according to the journal's standards and submitted online before May 31, 2019. Each paper is reviewed by the guest-editor and, if it is judged suitable for publication, is sent to at least two independent referees for double blind peer review.**

*IJNMHFF, Impact Factor: 1.399, 2014; Journal Citation Reports®, Thomson Reuters, 2015)

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SECRETARIAT

For more information please contact:

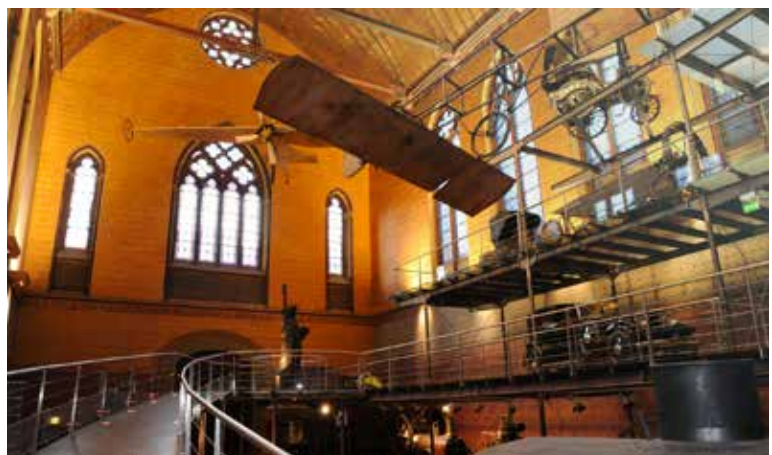
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As Paris is a well renowned touristic venue, you can find suitable accommodation venue quite easily, following your proper criteria. **We invite you to make your reservation as soon as possible.**

To help you in your research, please visit the official website and use the filters needed <https://en.parisinfo.com/where-to-sleep-in-paris/>



le cnam

Founded in 1794 by the Abbé Grégoire, the **Conservatoire National des Arts et Métiers (Cnam)** is a public institution of higher education and research under the supervision of the Ministry of Higher Education, Research and Innovation.

Its mission is to provide adult continuing education, especially vocational higher education and training. The rich diversity of educational specialties, covering a large number of professional sectors, make the Cnam a unique institution.

With 13 regional centers, 150 educational locations in France and 5 centers around the world (existing centers in Lebanon, Cote d'Ivoire, Morocco, Madagascar and China and ongoing projects for the creation of 2 centers in Tunisia and Senegal), Cnam is the only institution that offers adults of all ages living in many different territories and areas the tools they need to move forward.

Since its foundation, Cnam has closely combined academic knowledge and professional skills, so that learners can acquire the necessary skills to build the competences needed to advance further in their professional career. Cnam is a one-of-a-kind. Its high-level teaching consists of a harmonized collaboration and co-construction between the academic and economic world.

Cnam fulfils three main missions:

- Lifelong learning;
- Research;
- Diffusion of technical and scientific culture.

Rich and diversified, educational and certification programs are focused on specific professions and taught by professionals. These programs cover all sectors of activity and company positions, and are defined in close collaboration with companies in order to better respond to their needs. The institution grants 550 certifications, state diplomas and RNCP qualifications (National Register of Professional Certifications), from Level III to Level I, as well as its own diplomas.

The Cnam is composed of 16 National Teaching Units that span science and technology (energy and construction engineering, geomatics and topography, mechanical engineering and materials, computer science, mathematics and statistics, chemistry-pharma-agro science, marine sciences, aeronautics, railway engineering, nuclear energy), management (economics-finance- banking-insurance, accounting-control-audit, real estate law, strategy-innovation-entrepreneurship-business management, commerce-sales-distribution, marketing, urban and region planning) and human and social sciences (labor, counselling, training management, health).



ROYAL AERONAUTICAL SOCIETY

The **Royal Aeronautical Society** is “the one multidisciplinary professional institution dedicated to the global aerospace community”. The RAeS is the world’s only professional body which caters for the entire aerospace community. Throughout

the world’s aerospace community the name of The Royal Aeronautical Society is both well-known and well respected.

The Royal Aeronautical Society has a range of Specialist Interest Groups, covering all aspects of the aerospace world, serving the interests of enthusiasts and industry professionals alike.

Through their conferences and lectures, the Groups consider significant developments in their field, stimulate debate and facilitate action on key industry issues, reflecting the constant innovation and progress in aviation. In addition, the Groups, acting as focal points for all enquiries, form a vital interface between the Society and the world at large.

The activities of the Aerodynamics Group cover a wide range of topics of interest to industry, research establishments and universities. Several members of the group have been active in the creation of the TSB funded UK Aerodynamics Centre. The wind tunnel facility review initiated by the Group has been taken up by the Aero Centre. The Group is trying to work more closely with the AAAF and the AIAA Applied Aerodynamics Technical Committee. The Group organizes a regular Applied Aerodynamics Conference as well as hosting the Lanchester Named Lecture.



Our purpose is to ignite and celebrate aerospace ingenuity and collaboration, and its importance to our way of life.

Our promise is to be your vital lifelong link to the aerospace community and a champion for its achievements.

One Remarkable Fact Says It All: Since 1963, members from a single professional society have achieved virtually every milestone in modern American flight. That society is the American Institute of Aeronautics and Astronautics. With more than 35,000 individual members and 100 corporate members, AIAA is the world’s largest technical society dedicated to the global aerospace profession. Created in 1963 by the merger of the two great aerospace societies of the day, the American Rocket Society (founded in 1930 as the American Interplanetary Society), and the Institute of the Aerospace Sciences (established in 1933 as the Institute of the Aeronautical Sciences), AIAA carries forth a proud tradition of more than 80 years of aerospace leadership.

This is the place for everything, from exploring our history and purpose ... to catching up on the latest news ... Make sure you check out our prestigious Honors & Awards programs.

Recognizing excellence is one the most important contributions we make. Serving this elite audience and its historic mission is our commitment and our privilege. Now we invite you to learn more about AIAA – and share in the vision and excitement of this inspiring industry.



ONERA, First Aerospace Research Player in France.

ONERA (Office National d'Etudes et Recherches Aéronautiques) is the French Aerospace Research Center. It is a public research establishment, with both industrial and commercial responsibilities, reporting to the French Ministry of Defense and enjoying financial independence. With 2,000 employees, including 1,500 scientists, engineers and technicians, the expertise of ONERA covers all the scientific disciplines involved in aircraft, spacecraft, turbomachinery and missile design. It makes ONERA an essential partner in the French and European aeronautics and space community.

Its main missions are:

- to assist government agencies in charge of coordinating civil and military aerospace policy,
- to direct and carry out aerospace research,
- to design, produce and operate the resources needed
- to perform research and testing for manufacturers,
- to make available and commercialize the results of its research and facilitate application of this research by industry, including non-aerospace sectors,
- to support the French training policy for scientists and engineers.

Since its creation in 1946, ONERA has worked on all the major French and European aeronautical and space programs, including Mirage, Concorde, Airbus, Ariane, Rafale, etc... It's continuously upgrading its research and test facilities, some of them exhibiting unique capabilities.



The **Council of European Aerospace Societies** was formed in 1993 as the Confederation of European Aerospace Societies in recognition of the increasingly international nature of the aerospace business. The transition from Confederation to Council took place in 2003 with the intention of providing improved collaboration, legal

status and use of the resources of the constituent Societies.

In the mid 1980s Europe's main professional aerospace societies, after having had bilateral exchanges for a long time, recognized the increasingly international nature of aerospace business and the strength of European industrial alliances by beginning to develop close working relationships.

This culminated in the formation of the Confederation of European Aerospace Societies (CEAS) during the 1992 Farnborough Airshow and the official signing of the CEAS Constitution at the 1993 Paris Airshow.

Later on, in 2003, the Constituent Societies realized that a deeper collaboration was necessary which would provide CEAS with a legal status and more flexible resources. The new status transformed in 2006 the former Confederation into a Council and gave CEAS legal support under the Belgian law.

Apart from the consideration of CEAS as an association of national Societies, two branches have been established: one for aeronautics and one for space chaired by relevant professionals. These branches will be composed by technical committees with individual members and will be coordinated by a director who will manage the activities.

Today CEAS comprises fifteen member societies with a combined roughly 35.000 individual members.



Created in 1972, 3AF is the French Aerospace Society.

Its mission is to advance the aerospace profession, stimulate progress in the state of the art of aerospace science and technology and represent the profession in public policy discussions.

UNITE, SHARE, ENLIGHTEN, ADVANCE:

3AF is a forum for knowledge exchange.

Unite a network of more than 1500 members, 60 companies from the scientific aerospace community.

Share 10 international conferences and symposiums per year, experts publications.

Enlighten A scientific society, an expert pool of knowledge consulted by decision makers and media.

Advance 20 technical commissions which contribute to advancing the aerospace industry.

Strategic and scientific publications for experts and political actors, symposium proceedings, position papers, technological articles and interviews...3AF provides a wealth of specific publications to its members which enrich their knowledge and vision of the aerospace field.

3AF organizes international renowned symposiums to provide forums for international discussion and exchange of information about leading edge research and development activities. These conferences allow cooperation opportunities.

All publications on www.3af.fr

WEDNESDAY, MARCH 27

KEYNOTE CONFERENCE N°5 Nicolas DE CACQUERAY, Safran Aircraft Engines	
Session n°5a Turbomachinery	Session n°5b Shock-wave/ Boundary-layer interaction
Lunch	

M O R N I N G

TECHNICAL VISIT	
END OF AERO2019	

A F T E R N O O N

TUESDAY, MARCH 26

KEYNOTE CONFERENCE N°3 Eric COUSTOLS, ONERA	
Session n°3a Buffet	Session n°3b Wind turbines
Session n°3c Hypersonic flows	
Lunch	

M O R N I N G

KEYNOTE CONFERENCE N°4 Jeffrey P. SLOTNICK, Boeing Company Gerd HELLER, Airbus Operations	
Session n°4a Low speed, high lift configuration	Session n°4b Supersonic flows
Session n°4c Flow control on wing	

A F T E R N O O N

MONDAY, MARCH 25

KEYNOTE CONFERENCE N°1 Jean-Paul BOUCHET, CSTB	
Session n°1a Icing and wakes	Session n°1b CFD Methodology
Session n°1c Spinning bodies	
Lunch	

M O R N I N G

KEYNOTE CONFERENCE N°2 David ALFANO, Airbus Helicopters	
Session n°2a Helicopters	Session n°2b Stall
AWARD AND BANQUET	

A F T E R N O O N & E V E N I N G