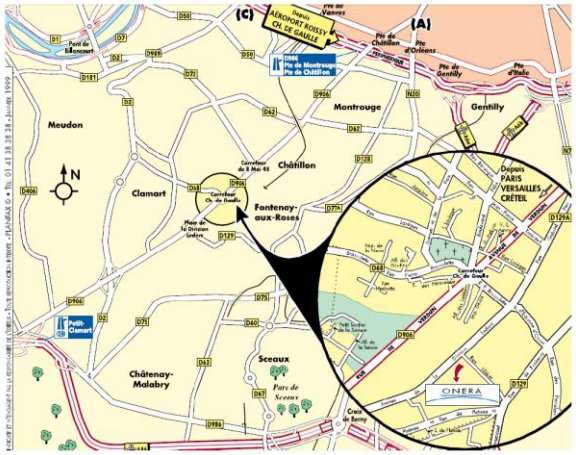
WELCOME

ONERA – Châtillon

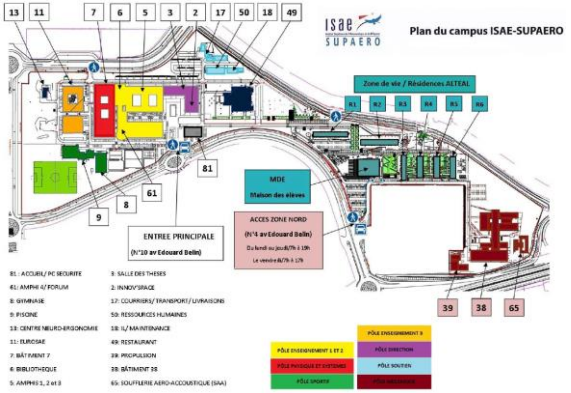
Salle CONTENSOU
29, Av. de la Division Leclerc
F-92320 CHATILLON



https://www.onera.fr/sites/default/files/content/chatillon-acces.pdf

ISAE SUPAERO

Salle des Thèses
10 avenue Edouard Belin
F-31055 TOULOUSE



https://www.isae-supaero.fr/fr/campus/acces-et-plan-du-campus/

AGENDA

08h30 - 09h00 Welcome
09h00 - 12h30 Conferences
12h30 - 14h00 Lunch
14h00 - 17h00 Conferences
17h00 - 17h30 Round table

DUPLEX

ONERA (Châtillon)
CONTENSOU Room

ISAE-SUPAERO (Toulouse)
Salle des Thèses

3AF
Association Aéronautique
Astronautique de France

TOWARDS HIGH-FIDELITY AERO-STRUCTURAL SIMULATION - THEORETICAL CHALLENGES AND PRACTICAL SOLUTIONS

30 November 2023

ONERA (Châtillon)

ISAE-SUPAERO (Toulouse)

Event organized by:
3AF Aerodynamics & Structures Technical Commissions
ONERA – ISAE SUPAERO

OBJECTIVES

Numerical simulation has become an indispensable tool in the aero-structural design of civil and military aircraft. It has even become commonplace to speak of multi-physics and multi-scale modeling, to refer to the increasingly important capacities of this tool to describe in great detail the complex nature - in several respects - of the objects and phenomena studied. Beyond this complexity, high-fidelity numerical simulation is not about describing the object of study in its entirety, but about mathematical prediction and precision of its response, requiring in particular the resolution of systems of equations that are in part non-linear. The computational resources required for these simulations to reach the highest levels of precision are such that they generally remain the exception, if the need is compelling, and excluded from design loops, let alone optimization loops.

The aim of this joint scientific and technical day organized by the 3AF Aerodynamics and Structures Technical Committees is to review the state of the art in high-fidelity digital aerostructural simulation, i.e. coupled fluid-structure simulation, in industry and research laboratories in the aerospace and defense sectors. Against the backdrop of theoretical difficulties preventing the systematic use of high-fidelity simulation, the practical solutions recently devised and evaluated to increase its scope of application will be discussed and analyzed: methods (non-linear domain, optimization, model reduction, artificial intelligence, etc.), validation and certification, applications (control-command, stability of fixed and rotating wings, aeroservo-elasticity, etc.), future challenges (urban air mobility, decarbonization, hydrogen, etc.) will be addressed.

To fuel the exchanges and discussions, a dozen speakers from the ASD sector will share their experience with us, and answer questions put to them by the audience. A round-table discussion will conclude the day, providing an opportunity to draw up a brief summary of the presentations, to debate the questions that are still wide open, and to draw conclusions on the lessons learned from the shared experiences.

CONFERENCES

08h30 - *Welcome*

09h00 - *High-Fidelity Numerical Simulation of Coupled Fluid-Structure Interaction Problems: Perennial Motivations, Recent Advances, and Outstanding Challenges*, Charbel Farhat (Stanford Univ.)

09h45 - *Recent developments for modular high fidelity aeroelastic simulations*, Antoine Placzek, Arnaud Lepage (ONERA)

10h15 - *Implementation of high-fidelity simulation for fluid-structure interaction at Dassault Aviation*, Zdenek Johan, Eric Garrigues (Dassault Aviation)

10h45 - *Break*

11h15 - *A Frequency-Time Partitioned Approach For Computing Fan Blade Flutter Induced Limit Cycle Oscillations With Nonlinear Friction On Contact Interfaces*, Nicolas Ombret (Safran Aircraft Engines)

11h45 - *Fluid/structure coupling for high-fidelity numerical prediction of helicopter rotor loads: dominant methods and limitations*, Biel Ortun (ONERA)

12h15 - *Lunch*

14h00 - *Helicopter Loads Estimation from Flight parameters Measurements: A Methodology Combining Harmonic Decomposition and Machine Learning Algorithm*, Caroline Del Cistia-Gallimard (AIRBUS-HE)

14h30 - *Non-linear aeroelasticity*, Fabio Vetrano (Airbus A/C)

15h00 - *Fluid-structure interaction of deformable wings targetting aerodynamic performance increase in subsonic and transonic regimes*, Marianna Braza (IMFT)

15h30 - *Break*

16h00 - *Verification & validation of scale models - Illustration with the HALO application*, Stéphane Grihon, Lionel Klotzli, (AIRBUS A/C)

16h30 - *Definition of High Fidelity in aircraft design: the problem of multidisciplinarity*, Eric Laurendeau (Polytechnique Montréal)

17:00 - Round Table

17h15 - *Closing of the day*

PRACTICAL INFORMATIONS

The day is open to all participants (subject to availability at each site). It will take place in duplex between the ONERA (Châtillon) and ISAE-SUPAERO (Toulouse) sites. Access formalities will be specified when you register (compulsory) on the ONERA website. To gain access to the ONERA and ISAE-SUPAERO sites, you will be required to present a valid form of identification on site on the day of the event.

Catering will be provided on site, and the cost of lunch - payable by participants - can be paid by credit card (only at ISAE-SUPAERO), also by cheque at ONERA.

Online registration on the ONERA Châtillon website, or by sending an electronic version of the registration form (PDF) to the following address:

ONERA/DMAS
29 avenue de la Division Leclerc
F-92320 Châtillon
Ou par courriel à : dmas-3af@onera.fr

The day's program is subject to change. It can be consulted at : https://www.onera.fr/fr/agenda/3af-30-Novembre-2023

BULLETIN D'INSCRIPTION

Name :

Last name :

Company :

Adress :

Email :

☐ Paris ☐ Toulouse

☐ Lunch
☐ Will need an invoice
☐ No lunch

Registration deadline : 03 November 2023

Electronic registration on the ONERA website at:
https://www.onera.fr/fr/agenda/3af-30-Novembre-2023