

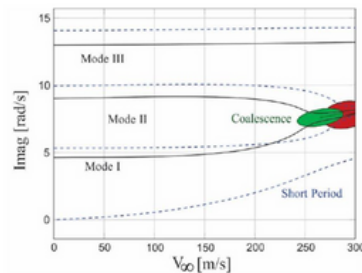
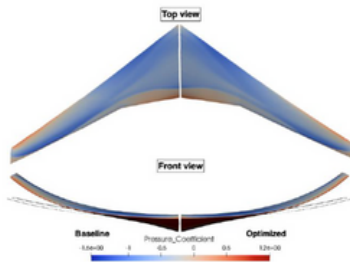
AEROSTRUCTURAL OPTIMIZATION AND AEROELASTICITY OF NEW GENERATION AIRCRAFT

This course will concern the following learning objectives:

- Multidisciplinary optimization considering aerodynamics and structures.
- Algorithmic Differentiation (AD) to support an efficient evaluation of the sensitivities needed by gradient-base optimization techniques.
- Effects of flight dynamics and aeroelasticity coupling.
- Formulation of coupled problems.

Syllabus

- Introduction: new efficient wings, aerostructural coupling, and optimization
- Optimization: definitions, classifications, numerical optimization methods (gradient-based optimization)
- Gradient evaluation: the adjoint method. Algorithmic differentiation.
- Using AD library on a simple problem: forward vs reverse modes
- MDO and MDO architectures. Coupled gradient evaluation.
- Application of high-fidelity Aero-structural optimization with AD
- Introduction on non-conventional aircraft and coupled flight dynamic and aeroelastic effects.
- Formulation of the coupled problem, unsteady aerodynamic forces integration.
- Applications on non-wing&tube aircraft.



LEARNING OBJECTIVES

- Familiarize with HMI design methods.
- Get an overview of the enabling technologies for new HMI in aeronautics.

Target audience: doctoral students, non-academic professionals, graduate and undergraduate students.

DATES AND TIME: 26-27 APRIL 2023, 9-12 AND 13.30 – 16.30 (6 HOURS PER DAY)

REGISTRATION AND CONTACTS

Course Code: 20230426

This course is part of the 2023 institutional activity for AIDAA members. The registration requires the purchase of one of the packages described here <https://www.aidaa.it/package-list/>, and the completion of the online form available on AIDAA webpage.

Course platform: Webex, a link will be sent via email as the registration is complete. At the end of each course, **attendance certificates** will be sent to participants via email.

For further info, please, contact academy@aidaa.it



SPEAKER

Dr. Cavallaro is an associate professor at the Aerospace Engineering Department by the University Carlos III of Madrid.

His research activities cover a wide range of physical and engineering problems. His main fields of investigation concern aircraft design and flight physics; in particular Fluid-Structure Interaction problems, mainly applied to unconventional aircraft configuration. He is also very active in the field of multidisciplinary design optimization.

Dr. Cavallaro trajectory has a remarkable international flavour. He obtained his MS at University of Pisa, under the guidance of Prof. Aldo Frediani, working on the Prandtl Plane concept. He then moved to Munich, working for Bauhaus Luftfahrt, a German research institute financed by Airbus Group, MTU, Liebherr Aerospace and Bavarian Government. Later, he was accepted in the joint-doctoral-program between San Diego State University (SDSU) and University of California San Diego (UCSD), where, tutored by Prof. Luciano Demasi he earned the Doctoral degree in December 2014. In 2015, Dr. Cavallaro was granted a prestigious international post-doc fellowship at the Technion (Israel Institute of Technology). Dr. Cavallaro was the recipient of several prestigious awards, among which the prestigious Collier Research HyperSizer/AIAA Structures Best Paper Award, earned at the 53rd AIAA/ASME/ASCE/AHS/ASC Conference (2012). Dr. Cavallaro's scientific production consists of 26 peer-reviewed journal papers and includes an invited review on the topic of Joined Wings on prestigious journal "Progress in Aerospace Sciences". He is active as reviewer of several prestigious aeronautical journals.

He is currently coordinating several projects funded at the European (horizon Europe) and national levels, and contracts with industries and research institutions such as Airbus, Aernnova and CIRA.

For what concerns teaching, he is currently giving the class of Helicopters at the undergraduate level, Advanced Aircraft Design I and II at the master level, Multidisciplinary Design and Optimization in the professional master of UC3M and Airbus. He successfully tutored 1 PhD and is currently co-advising 5 Doctoral theses.

