

Adaptive Structures for Aeronautical Applications

During the last decades, several examples of smart structural concepts have been investigated for different applications in aeronautics. At the same time, breakthrough technologies have emerged and properly matured to offer the right leverage for a step-change in the way of designing the next generation aircraft towards the development of advanced, fully adaptive configurations.

Aircraft structural components can be effectively conceived not only in the light of their primary load-bearing function, but rather as an integrated system of actuated and controlled components, harmoniously accomplishing advanced and intelligent tasks: they can sense pressure, strain, or any physical parameter defining their specific operative condition, and initiate an appropriate action to optimize their shape accordingly. All this, with the ultimate goal of morphing the aircraft aerodynamic surfaces in compliance with the most efficient shapes at each flight regime and/or to enable load alleviation functionalities. Several aspects have been addressed and are currently under investigation to bridge the gap between futuristic configurations and industrially relevant products, ready for certification and real flight operations. This symposium aims at highlighting the most relevant signs of progress made in this vibrant research field, with specific emphasis on industrial applications of adaptive structures. Potential topics of discussion will include but are not limited to the following:

- Methodologies and approaches for adaptive structures design and validation;
- Adaptive structural architectures (Compliant, Mechanisms-based architectures, Hybrid layout) and smart materials;
- Sensing, actuation, and control of adaptive structures;
- Experimental approaches for adaptive structures characterization and qualification;
- Reliability of adaptive structural systems and Fault and Hazard Analysis;
- Safety and certification aspects of adaptive structural systems.

***Please express your interest to contribute to this symposium when submitting your abstract.
Thank you.***

SYMPOSIUM N.18

ADAPTIVE STRUCTURES FOR AERONAUTICAL APPLICATIONS

Chaired by :

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Session 1

- Paper N. 1** R. M. Botez
ADAPTIVE WING DESIGN NOVEL MULTIDISCIPLINARY METHODOLOGIES
- Paper N. 2** Z. Zhang, A. De Gaspari, S. Ricci
COMPARISON BETWEEN DENSITY-BASED AND LOAD-PATH-BASED METHOD IN VARIOUS CAMBER AEROFOIL DESIGN
- Paper N. 3** R. Pecora, F. Amoroso
MORPHING WING FLAPS FOR LARGE CIVIL AIRCRAFT: THE CLEAN SKY-GRA CHALLENGE
- Paper N. 4** F. Rea, F. Amoroso, R. Pecora
STRUCTURAL DESIGN OF A THREE-MODAL CAMBER MORPHING WING FLAP FOR LARGE CIVIL AIRCRAFT APPLICATIONS
- Paper N. 5** M. Barile, G. Amendola, V. Ingenito, G. Barile, M. Migliaccio, L. Lecce,
DEVELOPMENT OF A MORPHING WING CONCEPT FOR THE SEAGULL A/C - THE NEXT GENERATION MARIN-AIR VEHICLE
- Paper N. 6** S. Ameduri, A. Concilio, B. Galasso,
BLADE MORPHING: DEVELOPMENT PATH OF A SMA BASED BLADE TWIST ARCHITECTURE
- Paper N. 7** B. Galasso, R. Fauci
PRELIMINARY TRADE-OFF STUDY OF DEPLOYMENT SYSTEMS FOR USV-3 UNMANNED SPACE RE-ENTRY VEHICLE

Session 2

- Paper N. 8** E. Villa
DAMPING PROPERTIES OF NiTi AND NiTiCu SMA SAMPLES: CORRELATION WITH MICROSTRUCTURE AND PERSPECTIVES IN AEROSPACE AND AERONAUTIC APPLICATIONS
- Paper N. 9** V. Cavalieri, A De Gaspari, S. Ricci
AN OPTIMIZATION PROCEDURE FOR THE OPTIMAL DESIGN OF MORPHING DEVICES
- Paper N. 10** A. Concilio, I. Dimino, S. Ameduri, R. Pecora, F. Amoroso, S. Ricci, A. De Gaspari
AN ITALIAN EXPERIENCE ON MORPHING AIRCRAFT SYSTEMS
- Paper N. 11** A. Airoidi, P. Bettini, M. Boiocchi, D. Rigamonti
ACTUATED COMPOSITE CORRUGATED LAMINATES FOR MORPHING AERODYNAMIC SURFACES
- Paper N. 12** I. Dimino, A. Concilio, M. Arena, M.C. Noviello, R. Pecora
MECHANICAL SYSTEMS FOR MORPHING WING STRUCTURES
- Paper N. 13** M. C. Noviello, F. Amoroso, R. Pecora, I. Dimino, A. Concilio
AEROELASTIC STABILITY ASSESSMENT OF A CS-25 CATEGORY AIRCRAFT EQUIPPED WITH MORPHING WING DEVICES
- Paper N. 14** M. Arena, F. Amoroso, R. Pecora
ACSIS (ACTUATION, CONTROL & SENSING INTEGRATED SYSTEM) FOR MORPHING STRUCTURES