

Special Issue on
Smart and Adaptive Structures for Aeronautical Applications

CALL FOR PAPERS

The greening of the next generation air transport surely represents one of the most ambitious targets currently pursued by the aviation community. Several research initiatives are running worldwide to develop innovative technologies for more ecosustainable aircraft concepts, characterized by lower pollutant emissions both in terms of noise and exhaust gas.

In this framework, high efficient aerodynamic configurations and advanced load control functionalities are recognized as the key paths to improve the performance of the whole aircraft while reducing its environmental footprint. Conventional solutions based on a rational tailoring of the aerodynamic shapes as well as the movable lifting surfaces with augmented functionalities have reached near-peak levels of efficiency, and the margins for further performance improvement are expected to be not so relevant.

A disruptive redefinition of the aircraft system, far from the consolidated design schemes, might represent the right way to effectively boost the performance and the competitiveness of future air-vehicles.

Nowadays, smart and adaptive structures have indeed reached the right level of technological maturation to offer a strong leverage for a practical implementation of such a radical step-change in aircraft design philosophies.

Structures can be 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 happens with the ultimate goal of morphing the aircraft aerodynamic surfaces in compliance with the most efficient shapes at each flight regime.

During the last decades, several examples of smart structural concepts have been explored for different applications in aeronautical fields. Mechanical, compliant, or hybrid solutions have been proposed and examined in combination with innovative actuation, control, and sensing systems.

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: from methodologies for the structural idealization and preliminary stress hand-calculation to advanced finite element modeling techniques supporting the executive design; from the integration approaches of sensors and actuators within the airframe to multiobjective control algorithms for smart structural system adaptation; and from specific experimental protocols for qualification and validation to the airworthiness requirements of unconventional architectures and embedded devices.

This special issue aims to highlight the most relevant signs of progress made in this research field.

Potential topics include but are not limited to the following:

- ▶ New methodologies and approaches for smart and adaptive structures design and validation
- ▶ 2. Adaptive structural architectures (compliant architectures, mechanisms-based architectures, hybrid compliant and robotized architectures, and inflatable structures)
- ▶ Sensing, actuation, and control of adaptive structures
- ▶ Smart materials for adaptive structures actuation and shape control
- ▶ Advanced methods for smart structural system manufacturing
- ▶ Experimental approaches for smart structures characterization and qualification
- ▶ Reliability of smart structural systems and fault and hazard analysis
- ▶ Safety and certification aspects of smart structural systems

Authors can submit their manuscripts through the Manuscript Tracking System at <https://mts.hindawi.com/submit/journals/ijae/sasaaa/>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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