

# Tentative Outline

## Special Thematic Issue for Recent Patents on Mechanical Engineering

### Recent advances in biomimetics aircraft wing structures

*Guest Editors: I. Dimino*

#### **Aims & Scope:**

Flexible and topology optimized aircraft wing structures are increasingly becoming a focus of interest for future generations of aircraft. Servo electromechanical actuation offers the chance to transition such concepts from basic research to innovative biomimetics wing surfaces capable to enhance aircraft aerodynamic performance and reduce fuel consumption. Coupling the emerging field of additive manufacturing and topology optimization further expands the opportunities for low weight, highly flexible and cost effective morphing aero structures while maintaining structural integrity and performance attributes.

This special issue addresses technology aspects related to the design and implementation of morphing wing concepts on-board of commercial aircraft. It moves from innovative adaptive wing design methodologies based on rigid-body mechanisms, whose discontinuities, however, may impact on wing aerodynamic efficiency, to the manufacturing complexities of topology optimized compliant structures, which allow smoother and more controllable morphing wing shapes without suffering from the characteristic problems of mechanisms, such as concentrated forces at the joints, friction, etc. Focus is also given to the main challenges faced by new fault-tolerant electromechanical actuators along with their reliability and safety-related issues for future morphing wing applications.

**Keywords:** Adaptive wing, topology optimization, compliant structures, mechanical systems, electromechanical actuators (EMA), adaptive skins, smart materials, smart sensors, aero-structural control systems, aeroelasticity of morphing, experimental characterization, wind tunnel tests, flight tests, fault and hazard analysis.

#### **Subtopics:**

The subtopics to be covered within this issue are listed below:

- Computational methods for bio-inspired morphing wing concepts (Compliant and mechanisms-based design, hybrid architectures, etc)
- Topology optimization of morphing wing structures
- Additive manufacturing-enabled design theory and morphing wing applications
- Electromechanical actuation for morphing wing devices
- Experimental approaches for morphing wing characterization and qualification
- Safety assessments and certification issues

#### **Schedule:**

- ✧ Manuscript submission deadline: May 15th 2019
- ✧ Peer Review Due: May 31st 2019
- ✧ Revision Due: June 15th 2019
- ✧ Announcement of acceptance by the Guest Editors: June 28th 2019
- ✧ Final manuscripts due: July 19th 2019

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