

## AIDAA 2019 CONGRESS

Rome

### **Mini-Symposium:** *Damage Tolerance of Composite Structures: Beyond the State of the Art*

#### **Abstract**

The current design and certification paradigm for damage tolerant composite structures is based on a “no growth” philosophy for “barely visible” flaws that may occur in service, such as delamination due to impact. This design philosophy entails limiting in-service strains to values that are essentially dictated by the compression-after-impact performance of fibre-reinforced composites. However, such strain values are significantly below the ultimate load carrying capability of fibre-reinforced plastics and this limits the structural weight savings that can be achieved by adopting composites in primary airframe and aero-engine components.

This Mini-Symposium aims to provide a comprehensive overview of novel tools and techniques that can enable moving beyond to current “no growth” design approach and towards a truly damage-tolerant philosophy for the design of composites structures, whereby flaws will be allowed propagating in a sub-critical fashion between inspections. This requires a multi-disciplinary approach that involves material science, manufacturing technology, numerical and experimental techniques, as well as in-service structural diagnostics and prognostics.

Contributions to the Mini-Symposium are therefore sought in, but not necessarily limited to, the following areas: manufacturing advances for damage tolerant composite structures, spanning from tailored hierarchical micro-structures to intra/inter-laminar toughening methods, including through-thickness reinforcement; novel modelling techniques for in-service fracture and fatigue assessments of primary composite structural elements, with particular emphasis on large scale simulations, global-local approaches and parallelization; experimental methods for large-scale structural testing of composite assemblies, including the characterisation of environmental effects due to temperature and moisture uptake in fibre-reinforced plastics; structural health monitoring and non-destructive evaluation/inspection of composites structures.

#### *Chairmen*

Dr Giuliano Allegri

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