Title: Advanced modeling of complex materials and structures

Rossana Dimitri, rossana.dimitri@unisalento.it (Università del Salento, Italy)
Francesco Tornabene, francesco.tornabene@unisalento.it (Università del Salento, Italy),
J.N. Reddy, jnreddy@tamu.edu (Texas A&M University, USA)

Summary

In a context where composite materials have been increasingly used for many engineering applications, this minysimposium aims at gathering together experts and young researchers in modeling heterogeneous materials and structures at different scales. Enhanced structures and composite materials feature internal length scales and a non-local behavior, whose response could be analyzed parametrically, including possible effects of staking sequences, ply orientations, agglomeration of nanoparticles, volume fractions of the constituents, and porosity level.

In addition to fiber-reinforced composites and laminates, studies on innovative components such as functionally graded materials (FGMs), Carbon nanotubes (CNTs), graphene nanoplatelets, SMART constituents, as well as innovative and advanced classes of composites can be explored. Examples of SMART applications can possibly involve large stroke SMART actuators, piezoelectric sensors, shape memory alloys, magnetostrictive and electrostrictive materials, or auxetic components. These constituents could be included in the lamination schemes of SMART structures to control and monitor the vibrational behavior or the static deflection of several composites.

Thus, the development of advanced theoretical and computational models for composite materials and structures will be studied for complex systems, including their static, dynamic and buckling response, fracture mechanics at different scales, as well as adhesion, cohesion and delamination of materials and interfaces. Contributions on experimental aspects are also welcome from scientists working on mathematics and mechanics, involving different industrial applications.

Keywords

- Adhesion
- Advanced Computational methods
- Auxetic materials
- Buckling behavior
- Carbon nanotubes
- Complex materials
- Composite beams, plates and shells
- Constitutive models
- Damage
- Delamination
- Dynamics
- Fracture mechanics

- Functionally graded materials
- Homogenization techniques
- Metamaterials
- Nanostructures
- Smart materials
- Statics
- Theoretical, numerical, and experimental strategies