MARIE SKŁODOWSKA-CURIE ACTIONS

A project under European Union's Horizon 2020 research and innovative program

FULLY INTEGRATED ANALYSIS, DESIGN, MANUFACTURING AND HEALTH-MONITORING OF COMPOSITE STRUCTURES

Inspiration

Composite structures are massively exploited in many engineering fields. For instance, the state-of-the-art civil aircraft B787 and A350 are mostly made of composite materials. However, designing for composite materials poses a challenge as the skills and competencies in working with classic metal materials often prove inadequate. Insight into many different disciplines and close academic-industrial cooperation is required to fully exploit the capabilities of composite structures, but existing training programmes are often focused on specific themes and disciplines rather than on a broad interdisciplinary approach integrating academic and industrial perspectives.

Innovation

Funded by the European Commission through the Marie Sklodowska-Curie programme within Horizon2020, the FULLCOMP project aims to create a unique multidisciplinary, intersectoral and international research training network with a strong academic basis and industrial partnerships in order to train a new generation of top young researchers for academic and industrial positions across Europe. The multidisciplinary nature of the programme is guaranteed by the participation of seven universities, a research centre and an industrial manufacturer, located in eight different countries. Within the project, researchers will also develop integrated analysis tools to improve the design of composite structures. The full spectrum of the design of composite structures will be dealt with: manufacturing, health monitoring, failure, modelling, multi-scale approaches, design, optimisation, experimental testing, prognosis and prognostic. Entrepreneurship in the composite materials and structures sectors will also be addressed.

Impact

The skills and the employability of young researchers will be greatly enhanced through this interdisciplinary and intersectoral training programme, while the results of the research carried out within FULLCOMP will be applicable to many engineering fields: aeronautics, automotive, mechanical, wind energy and space.

Work-packages

1. Project management and network coordination
2. Analysis and computational methods
3. Design and optimization
4. Damage and failure analysis
5. Health-Monitoring, repairing and non-destructive testing
6. Multiscale Methods
7. Manufacturing and experimental approaches
8. Entrepreneurship
9. Dissemination and transfer of knowledge
10. Recruitment and training

Publications

- **Composite Materials and Structures in Aerospace Engineering.** Edited by *E. Carrera*. Trans Tech Publications, 2016. doi: 10.4028/www.scientific.net/AMM.828

- *Pagani, A.G. de Miguel, M. Petrolo and E. Carrera.* **Analysis of laminated beams via Unified Formulation and Legendre polynomial expansions.** Composite Structures, 2016. doi: 10.1016/j.compstruct.2016.01.095

- *G. Giunta, G. De Pietro, H. Nasser, S. Belouettar, E. Carrera, M. Petrolo.* **A thermal stress finite element analysis of beam structures by hierarchical modelling.** Composites Part B: Engineering, 95: 179-195, 2016. doi: 10.1016/j.compositesb.2016.03.075.

Upcoming Events

1. **FULLCOMP Special Session** at the 19th International Conference on Composite Structures (ICCS19), 5-9 September 2016, Porto, Portugal

2. Spring School on **Computational Methods for the Analysis, Design, and Failure of Composites,** April 2017, International Centre for Mechanical Sciences (CISM), Udine, Italy.

Partners

Politecnico di Torino
Prof. Erasmo Carrera
Dr. Marco Petrolo

University of Bristol
Prof. Paul Weaver
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Ecole Nationale Superieure d'Arts et Metiers
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Royal Melbourne Institute of Technology
Prof. Adrian Mouritz

Universidade do Porto
Prof. António Mendes Ferreira

University of Washington
Prof. Anthony Waas

ELAN-AUSY GmbH
Dr. Steffen Czichon

Early Stage Researchers (ESRs)

ESR1 – Guohong Li
Variable, mixed, linear and nonlinear kinematic shell formulations

ESR2 - Alberto García de Miguel
Diagnostic and prognostic of composite structures and computational multi-scale approaches

ESR3 - Ibrahim Kaleel
Impact response through a variable kinematic component-wise approach based on Carrera Unified Formulation

ESR4 - Margarita Akterskaia
Failure analysis of composite structures through global-local methods

ESR5 - Sander van den Brook
Reduced-order models and probabilistic analysis for nonlinear structural analysis of composite structures

ESR6 - Yanchuan Hui
Multi-scale modelling and design of composite structures

ESR7 - Gabriele De Pietro
Modelling and design of multi-stable composite structures

ESR8 - Sergio Minera
Buckling of Thin-Walled shells using Carrera Unified Formulation

ESR9 - Mayank Patni
3D stress fields in localized areas of stiffened panels: stringer terminations and rib-foot connectors

ESR10 - Lorenzo Cappelli
Durability of thermoplastic composite and variability effects

ESR11 - Pietro del Sorbo
Multi-scale approach using an original discrete element method for the treatment of impact on dry textile

ESR12 - Georgios Balokas
Advanced methods for design, sizing and manufacturing of composite structures in aerospace applications