Preface

Natural composites and hybrid sandwiches for modern aircrafts and spacecrafts

Introduction from the Guest Editor

The use of *composite* and *sandwich* materials for aircraft and spacecraft secondary or/and primary structural components has greatly evolved during the last few decades. The former has moved from two-dimensional to three-dimensional (3D) fibre reinforcements and tufting and from synthetic to *natural* (bio) material sources, while the latter exploited *hybridization* of materials for faces and cores and also transited from synthetic to *natural* sources. These new research and engineering practices have posed challenges to the manufacturers, simulation engineers and computer-aided designers. This concerned, in particular, the mastering of the resulting non-classical elastic behaviours that are necessary for modelling, simulating and predicting their healthy and damaged responses. Thus, academic and industrial researchers have recently focused their efforts on these *natural* composites and *hybrid* sandwiches *design*, *manufacturing* or assembly processes, *characterization* and *simulation* specific tools.

Therefore, this topical issue of *Advances in Aircraft and Spacecraft Science* (AAS), an international journal, contains six successful *peer-reviewed* manuscripts from eleven submitted ones. Five of the former were presented at the 7th *International Symposium on Air/Craft Materials* (ACMA) held at Compiègne (France) from 24 to 26 April 2018. The six successful contributions addressed the above discussed topics, in particular: (i) the *manufacturing* of *natural* (hemp) fibre woven fabrics/polypropylene honeycomb complex sandwiches (Antony *et al*. 2019) and practical detailed finite element *simulation* approach for the pre-*design* of actual *hybrid* glass fibre reinforced polymer-aluminium honeycomb sandwiches (Benjeddou and Guerich 2019); (ii) *manufacturing* and *characterization* of *tufted* preforms with complex shape (Gnaba *et al*. 2019), intersections using *tufting* and 3D connectors (Clegg *et al*. 2019) and *natural* (flax) non-woven preforms (Omrani *et al*. 2019); (ii) static and dynamic *characterization* of a *hybrid* carbon fibre reinforced polymer-aluminium-based flexible scaled joined-wing flight test demonstrator (Corregado *et al*. 2019).

I hope sincerely that this topical issue contributes significantly to the state-of-the-art of this aircraft and spacecraft research and engineering interest area of *natural composites and hybrid sandwiches* so that it can serve the needs of AAS academia and industry readers and contributors. I would like also to take this opportunity to thank, the successful *authors* for their good contributions, the *reviewers* for their help in assessing the eleven submitted contributions, the *Editor-in-Chief* of AAS (Professor Erasmo Carrera) for letting me the responsibility to select this issue submissions, nominate the reviewers and manage 10 of the 11 manuscripts, and the *Associate Editor* of AAS (Dr. Alfonso Pagani) for managing my contribution (for intellectual integrity reason) and for his prompt reactions and motivated answers to my numerous emails.

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References

Antony, S., Cherouat, A. and Montay, G. (2019), "Hemp fibre woven fabrics/polypropylene based honeycomb sandwich structure for aerospace applications", *Adv. Aircraft Spacecraft Sci*., **6**(2), 87-103.

Benjeddou, A. and Guerich, M. (2019), "Free vibration of actual aircraft and spacecraft hexagonal honeycomb sandwich panels: A practical detailed FE approach", *Adv. Aircraft Spacecraft Sci*., **6**(2), 169-187.

Carregado, J., Warwick, S., Richards, J., Engelsen, F. and Suleman, A. (2019), "Static and dynamic characterization of a flexible scaled joined-wing flight test demonstrator", *Adv. Aircraft Spacecraft Sci*., **6**(2), 117-144.

Clegg, H.M., Dell'Anno, G. and Partridge, I.K. (2019), "Creating damage tolerant intersections in composite structures using tufting and 3D woven connectors", *Adv. Aircraft Spacecraft Sci*., **6**(2), 145-156.

Gnaba, I., Wang, P., Legrand, X. and Soulat, D. (2019), "Manufacturing and characterization of tufted preform with complex shape", *Adv. Aircraft Spacecraft Sci*., **6**(2), 105-116.

Omrani, F., Soulat, D., Ferreira, M. and Wang, P. (2019), "Effects of needle punching process and structural parameters on mechanical behavior of flax nonwovens preforms", *Adv. Aircraft Spacecraft Sci*., **6**(2), 157-168.