A special issue on Rotorcraft Safety

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DOI
10.1016/j.ast.2022.107866

Publication date
2022

Document Version
Final published version

Published in
Aerospace Science and Technology

Citation (APA)
Quaranta, G., Ekaterinaris, J., Barakos, G., Filippone, A., White, M., Anderson, D., & Pavel, M. (2022). A special issue on Rotorcraft Safety. *Aerospace Science and Technology*, *129*, Article 107866. https://doi.org/10.1016/j.ast.2022.107866

Aerospace Science and Technology 129 (2022) 107866

Contents lists available at ScienceDirect

Aerospace Science and Technology

www.elsevier.com/locate/aescte

Editorial

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The project NITROS (Network for Innovative Training on Rotorcraft Safety), a Marie Skłodowska-Curie Action Joint European Doctorate on Rotorcraft Safety, had as its major goal the development of methods, systems, and tools to improve rotorcraft safety focusing on this multidisciplinary approach. The project received funding under the Marie Skłodowska-Curie grant agreement No 721920 and was delivered by a group of talented early career researchers graduating with dual PhD degrees from the participating institutes. NITROS distributed its research between the Politechnico di Milano (POLIMI), the University of Glasgow, the University of Liverpool, and the Technical University of Delft.

This special issue presents several important results that have been reached within NITROS to enhance rotorcraft safety and that were presented during the final workshop of the project. Five papers made it through the stringent review process and are printed together in this special issue. The work covers all aspects of rotorcraft safety and highlights include the development of decision support systems for navigation that automate and support the interaction between the human pilot and the rotorcraft. As the NITROS research shows, the reduction of pilot workload with the right level of automation is a major step towards safety operations.

Work on safety related to the external environment is showcased here by studies of helicopter flows near ground with the associated brown-out phenomena, and studies of helicopters within strong turbulence and wakes like what is seen during ship helicopter landing. A variety of methods are put forward and one cannot fail to see the advent of very sophisticated methods that are based om computational fluid dynamics reaching high levels of fidelity. At the same time the same methods are used within simulation environments to bridge the gap between the external flow, the vehicle dynamics, and the pilot workload, leading to integrated safety studies without the risks of actual flight tests. Adverse weather conditions and their effect on safety were also studied within NITROS with helicopter icing simulations. Again, the trend seen is for the use of more and more simulation based on high fidelity methods that aim to capture more of the flow physics associated with ice formation and quantify the effect of icing on performance and ultimately impact on safety.

The structure of the helicopter itself was also studied under NITROS with research presented here on the use of structural health monitoring of metal/composite hybrids achieved via fiber optical sensors. This research shows the benefits of having helicopters that can provide data about their structure reducing maintenance, preventing failure, and increasing availability of these versatile and unique flying machines.

We hope that readers of the *Aerospace Science and Technology Journal* will find the published papers interesting and informative.

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Available online 6 September 2022

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https://doi.org/10.1016/j.ast.2022.107866