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New aerodynamic configurations to improve aircraft performances

Eusebio Valero
Universidad Politecnica de Madrid, Spain

An Air Transport System has become an indispensable part of Europe's economic infrastructure. The Commercial Aeronautics Sector is well aware that it has to find an acceptable balance between the constant fierce competitive pressures upon it and the public's expectations of cheaper fares but reduced environmental impact including community noise around airports and global warming. In order to achieve such a balance in the future, a strategy is required for competitive excellence dedicated to meeting society's needs.

The realization of this vision cannot be achieved without significant technology breakthroughs in the area of aerodynamics and other disciplines such as materials and structures. Improved aerodynamic designs and the introduction of new aerodynamic technologies should play not only a key role in improving aircraft performance but, also, contribute strongly to product cost and operability. Substantial R&T exploration and development require to be conducted in order to provide the required technologies.

A review of those technologies which show a potential to deliver breakthrough improvements in the aerodynamic performance of the aircraft is shown. The focus is on new aircraft configurations to reduce induced drag and noise, laminar and turbulent drag reduction technologies and flow control devices, which aims to improve the performance of the airplane under separated flow conditions of unsteady nature, and to reduce the complex high-lift devices. Different examples of flow control, the underline physics involved in the unsteady mechanics and the current mathematical tools which aim to predict such behaviors and shed light of how to control them are exposed.

Biography

Eusebio Valero completed his Ph.D. in 1999 from the Polytechnic University of Madrid- School of aeronautics and postdoctoral studies in the Von Karman Institute of Fluid Dynamics. He currently working in the development of numerical and analytical methods for aerodynamic and flow control prediction, having more than 25 papers in different international journals (AIAA, Journal of Computational Physics, Aerospace Science and Technology, etc). He is also project evaluator of the European Commission in the aeronautic field. He is currently the coordinator of three European FP7 funded projects in topics related to detached flow, stability analysis or flow control in collaboration with more than 10 international institutions and AIRBUS and EADS companies.

eusebio.valero@upm.es