8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
14th World Congress on Computational Mechanics (WCCM XIV)
July, 19 - 24, 2020, Paris/ France

STS 08

Application of Hybrid Laminar Flow Control for Drag Reduction of Transport Aircraft

Chairs: Geza Schrauf* and Dietrich Knörzer**

Session Abstract

Key words: Fluid Dynamics, Drag Reduction, Flow Control, Aeronautics, Laminar Flow

Europe's Vision for Aviation 'Flightpath 2050' sets has set a target of 75% reduction of specific fuel consumption by 75% compared to the standard for civil aviation in 2000. To achieve this ambitious goal, also emphasized by the new universal climate change agreement of the United Nations climate conference in Paris in December 2015, we need to work on three topics: improvement of engine efficiency, reduction of the aircraft weight, and aerodynamic drag reduction. Because friction drag contributes to approximately half of the aircraft's drag, the most promising technologies for drag reduction are Natural Laminar Flow (NLF) for short and medium-range aircraft and Hybrid Laminar Flow Control (HLFC) for long-range aircraft [1]. In this session we will present the latest results on HLFC from European projects.

Within the AFLoNext project, a simplified HLFC system for the vertical tail plane of an Airbus A320 aircraft was designed, built and flight tested. We will give an overview of the flight tests an present some results.

A second HLFC topic within AFLoNext was the application of HLFC for wings of long-range aircraft. This work is continued within the European Clean Sky 2 programme and we plan to report on the latest results.

References

[1] G. Schrauf: "Status and perspectives of laminar flow." The Aeronautical Journal, December 2005, Vol. 109, No. 1102, pp. 639-644.

* Dr. Geza Schrauf
DLR
38108 Braunschweig, Germany
geza.schrauf@dlr.de

**Dr.-Ing. Dietrich Knörzer
Aeronautics Consultant
1180 Brussels, Belgium
dietrich.knoerzer@outlook.com

Agenda of STS 08

Application of Hybrid Laminar Flow Control for Drag Reduction of Transport Aircraft

Hybrid Laminar Flow Control Research Activities within the Frame of Recent European Funded Projects
Martin Wahlich, Airbus, Bremen, Germany, martin.wahlich@airbus.com

Airbus A320 Flight Tests of the AFLoNext Project with the Vertical Tail Plane Equipped by a Hybrid Laminar Flow Control System
Geza Schrauf, DLR, Braunschweig, Germany, geza.schrauf@dlr.de

Natural Laminar Wing Manufacturing Developments, Ground Tests Validation
Miguel Ángel Castillo, Federico Martín de la Escalera, David Cruz, Aernnova, Madrid, Spain, miguelangel.castillo@aernnova.com

Laminar Flow Control along the Attachment Line of a Swept Wing
Fabien Mery, Maxime Forte, Olivier Vermeersch, ONERA, Toulouse, France
olivier.vermeersch@onera.fr

Transition Prediction for Flows with Suction Using the e^N-Method
Normann Krimmelbein, DLR, Braunschweig, Germany, normann.krimmelbein@dlr.de

Impact of Homogenous Suction on the Prediction of Drag and Transition for Transport Aircraft with Hybrid Laminar Flow Control
Martin Kruse, DLR, Braunschweig/ Germany, martin.kruse@dlr.de