

Optimization Strategies for High-Lift Design

P. Iannelli, M. Minervino
CIRA Italian Aerospace Center
Via Maiorise, 81043 Capua, Italy

E. Benini, R. Ponza
University of Padova
Via Venezia, 1, 35131 Padova, Italy

D. Romano
PIAGGIO Aerospace Industries
Via Campi Flegrei, 34, 80078 Pozzuoli, Italy

Abstract

The present paper reports the main outcomes of an activity performed within the DeSiReH project, a European Funded Collaborative Project under the 7th Framework Program devoted to improving the industrial design process for laminar high-lift wings.

First, the description of the task to design a high-lift system has been analyzed to derive formulations of the design space in terms of design variables and objective functions to be used in an automatic design optimization process.

Second, multi-point shape and setting optimization of a 2-D high lift system, a wing section of the DLR-F11 wing-body high-lift configuration, in both take-off and landing conditions have been performed. Extensive work has been put to derive guidelines and “do’s and don’t’s” for applying automatic design optimization to such complicated cases.

Third, the 3D DLR-F11 (KH3Y) wing-body high-lift configuration was chosen for optimization of the take-off position to see the difference between 2D wing section optimization and full 3D optimization.