

# AERODYNAMIC ANALYSIS AND OPTIMIZATION OF A REGIONAL TRANSPORT AIRCRAFT

Pierluigi Della Vecchia<sup>1</sup>, Gennaro Serino<sup>2</sup>

*Faculty of Aerospace Engineering, Naples, Italy, 80125*

## Abstract

The geometry of a typical regional transport aircraft is modified to reduce drag and improve performances, in particular cruise speed. Once performed a preliminary aerodynamic analysis on the original geometry, in order to detect those portions of the body shape whose modification mostly influences drag variation, an automatic procedure, manageable through MATLAB, allows to modify those parts using interpolating curves and surfaces, respectively NURBS and NURBS COONS. Within the modification loop, each new geometry is analyzed through a panel code solver until optimized shapes are found. Finally, the optimized body is exported into a CAD format (IGES) suitable for design and production. The optimization process has guaranteed a reduction of 3 percent of the total drag and an increase of 2 percent of cruise speed respect to the original configuration.

## I. Nomenclature

$AR$	= Aspect ratio
$A_{ref}$	= Reference area for Squire-Young formulation
$b$	= Wing span wise
$CD_{WB}$	= 3D total drag coefficient referred to wing-body configuration
$CD_0$	= 3D drag coefficient at zero lift referred to the full aircraft
$CD_{0,WB}$	= 3D drag coefficient at zero lift referred to wing-body configuration

---

<sup>1</sup> Aerospace and Astronautical engineer and collaborator, Dept. of Aerospace Engineering, Via Claudio 21 80125 Naples, Italy, pierluigi257@interfree.it

<sup>2</sup> Aerospace and Astronautical engineer and collaborator, Dept. of Aerospace Engineering, Via Claudio 21 80125 Naples, Italy, ser.gen@hotmail.it