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Of A

Advances in computing power have enabled computational fluid dynamics (CFD) to become a crucial tool in aerodynamic

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design. To facilitate CFD-based design, the combination of gradient-based optimization and the adjoint method for computing derivatives can be used to optimize designs with respect to a large number of design variables.



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An aerodynamic design optimization framework using a ...  
This paper presents the application of an adjoint method to the aerodynamic design optimization of a turbine blade. With the adjoint method, the complete gradient information

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needed for optimization can be obtained by solving the governing flow equations and their corresponding adjoint equations only once, regardless of the number of design parameters.

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A gradient-based optimization algorithm is used in conjunction with a discrete adjoint method that computes the derivatives of the aerodynamic forces. A total of 273 design variables—twist, airfoil shape, sweep, chord, and

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For transonic wing design,  
aerodynamic shape optimization  
has the potential produce high-  
performance, low-drag designs.

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Typically, optimizations attempt to improve the performance at a small ...

(PDF) Aerodynamic Shape Optimization (ASO)

Aerodynamic design of high speed airfoils and wings is carried

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out by a new Genetic Algorithm software and applied to novel configurations like the Oblique Flying Wing. The goal is achieved by establishing a flexible input data generator for both direct and inverse design: geometry and flow quality (pressure

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distribution) is modelled by a set of analytical functions with parameterized input.

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When it comes to fluid- or aerodynamic shape optimization,

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we have been talking a lot about very specific applications in our recent blog posts, such as the design of race car rear wings or the shape optimization of turbine blades. Simulation engineers from the aerospace, automotive or turbomachinery sector are



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interested in finding optimal Of designs with superior performance but also with a high robustness in terms of operating points.

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A Practical Guide > CAESES

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The optimization is performed using genetic algorithms (GA) and is based on the Aerodynamic Train Model (ATM) as the reference geometry. Since the GA requires the parameterization of each optimal candidate, 25 design variables are used to

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define the shape of the train nose and, in particular, to reproduce that of the ATM.

Aerodynamic drag optimization of a high-speed train ...  
downforce and less aerodynamic drag', an optimization project is

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determined which is of 6.0% more down force and 5.0% less aerodynamic drag compared to the initial one.

(PDF) Aerodynamic design optimization of race car rear wing  
To build an optimal design system

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which is used for the wing-pylon-nacelle optimization, there are three key techniques to be resolved: (A) an efficient and robust geometry modification method is required especially for juncture regions, and the fast/robust grid distortion

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technology becomes an important concern; (B) for new design variables, the key which directly affect the design result and efficiency is whether the aerodynamic characteristics of the corresponding geometry can be obtained ...

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Aerodynamic design optimization  
of nacelle/pylon position ...

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Method. ... Adjoint-Based Shape  
Optimization for the Aerodynamic  
Components of Drag in Viscous

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Aerodynamic Design Optimization  
Using the Drag ...

The aerodynamic design is performed at one single cruise condition: the Mach number is equal to 0.85, the lift coefficient



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to 0.26, and the altitude to 13,000 m. The baseline configuration is progressively improved: the wave and vortex induced drag components are reduced, the wetted area is slightly decreased and the pitching moment coefficient

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about the reference centre of  
gravity location is ...

Aerodynamic Design Optimization  
of a Flying V Aircraft ...

Performing a simulation-driven  
aerodynamic design optimization  
is a challenging task due to the

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Computational expensiveness of high fidelity models, the considerable number of design parameters, the variety of disciplines that must be considered... etc.

A surrogate-based integrated

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framework for the aerodynamic ...

A Computational Aerodynamic  
Design Optimization Method

Using Sensitivity Analysis . By  
Mohamed E. Eleshaky. Abstract. A  
new and efficient procedure for  
aerodynamic shape optimization  
is presented. The salient

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lineaments of this procedure are:  
(1) using a discrete sensitivity analysis approach to determine analytically the aerodynamic ...

A Computational Aerodynamic Design Optimization Method ...

The power of aerodynamic shape

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Optimization (ASO) based on Computational Fluid Dynamics (CFD) is to automatically improve the design of aircraft components. Today, the fastest approach in this type of optimization is a combination of gradient algorithms for non linear

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addresses this problem by

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navigating the subtle trade-offs between the competing objectives of geometry parameterization. It begins with the fundamentals of geometry-centred aircraft design, followed by a review of the building blocks of computational geometries, the



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Optimization of Airframe  
curve and surface formulations at  
the heart of aircraft geometry.

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references. Finally, we extend the  
aerodynamic shape optimization

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Studies to design an unconventional configuration, the blended-wing-body aircraft. The best compromise between performance and stability was achieved by enforcing a small static margin that can be tolerated in a commercial

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airplane (1%) and including the center of gravity position as a design variable.

High-Fidelity Aerodynamic Design Optimization of Aircraft ...

This article is organized as follows: in Section 2.1, the PSO

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methodology is built up, and the algorithm performances are validated by the aerodynamic design of a supercritical airfoil; the numerical simulation and airfoil parameterization methods are given in Sections 2.2 and 2.3, respectively; in Section 3,

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deterministic optimization and multi-objective robust design are conducted to get an optimal airfoil to meet the design requirements; and in Section 4, several important design ...

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of Transonic Natural... Kind Of

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addresses this problem by  
navigating the subtle trade-offs

between the competing  
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the fundamentals of geometry-centred aircraft design, followed by a review of the building blocks of computational geometries, the curve and surface formulations at the heart of aircraft geometry.

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Geometry and Optimization...

Aero-mechanical Modal Approach  
to Aerodynamic Performance

Optimization A blading design  
optimization system has been  
developed using an

aeromechanical approach and  
harmonic perturbation method.



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