

# On the Treatment of Uncertainties in Aerodynamic Design

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**Abstract:** Uncertainties pose problems for the reliability of numerical computations and their results in all technical contexts one can think of. They have the potential to render worthless even highly sophisticated numerical approaches, since their conclusions do not realize in practice due to unavoidable uncertainty in parameter values, initial and boundary conditions, geometry, etc. The proper treatment of these uncertainties within a numerical context is a very important challenge. In this talk, we discuss a novel approach towards aleatory uncertainties for the specific application of optimal aerodynamic design under uncertainties. An appropriate robust formulation of the underlying deterministic problem and efficient approximation techniques of the probability space are investigated. Finally, algorithmic approaches based on multiple-setpoint ideas in combination with one-shot methods are presented as well as numerical results.

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