

SURROGATE-BASED GLOBAL OPTIMIZATION METHODS IN PRELIMINARY AERODYNAMIC DESIGN

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ABSTRACT

Aerodynamic design, with particular reference to its early stages, requires to explore the design space in a global sense in order to locate the optimal candidate. Global optimization methods (e.g., evolutionary algorithms) can meet this requirement as they have the ability to work with noisy objective functions without assumptions on continuity and with a high potential to find the optimum of complex problems. However, they involve a vast number of evaluations even for a small number of design variables. As each evaluation requires a CFD complete analysis, this would make the method unfeasible, in terms of computational cost. Some papers in the literature [1, 2] try to overcome this drawback by introducing surrogate evaluation models to calculate the fitness of the candidate solutions, thus replacing the time-demanding CFD tool. Therefore, a low-cost evaluation approach seems appropriate to handle complex CFD-based design problems with global optimization methods. Recently, a GARTEUR Action Group (www.garteur.org) has been established to explore these approaches. The main objective of the AG [3] is, by means of a European collaborative research, to make a deep evaluation and assessment of surrogate-based global optimization methods for aerodynamic shape design, dealing with the main challenges as the curse of dimensionality, reduction of the design space and error metrics for validation, amongst others.

This mini-symposium aims to present the partial results of the AG, as well as other possible external contributions, which will enrich the collaborative network on this topic.

REFERENCES

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