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HEAT TRANSFER OPTIMIZATION OF A RIBBED SURFACE USING SURROGATE-ASSISTED GENETIC ALGORITHMS

Panagiotis Tsirikoglou, Ghader Ghorbaniasl, Simon Abraham, and Chris Lacor

Vrije Universiteit Brussel (VUB), Department of Mechanical Engineering Fluid Mechanics and Thermodynamics Research Group
Pleinlaan 2, 1050, Brussels, Belgium
e-mail: Panagiotis.Tsirikoglou@vub.ac.be, Ghader.Ghorbaniasl@vub.ac.be, Simon.Abraham@ulb.ac.be, Chris.Lacor@vub.ac.be

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Abstract. *Over the last years, complex design and optimization engineering problems became more and more demanding in computational time. Despite the advances made in computer science, these demands are prohibitive in some cases, in many engineering fields such as fluid mechanics and heat transfer. Aiming to alleviate this, surrogate response models are introduced and coupled with optimization drivers to deliver cheaper and accurate optimization results. The present paper investigates the performance of various surrogate-assisted optimization schemes applied to a heat transfer modeling problem of a ribbed surface. In this study, performance of different surrogate models such as Kriging, Co-Kriging and Support Vector Regression in different evolutionary optimization schemes are assessed. These schemes employ the aforementioned surrogate models coupled with different infill strategies depending on the availability of an uncertainty measure for the prediction. The results show that Co-Kriging model provides accurate results in comparison with the other metamodels while the computational time is reduced by more than 50%. It is illustrated that the combination of multi-fidelity approaches and sophisticated infill strategies can provide accurate predictions at a reduced computational cost.*