Global sensitivity analysis for multidisciplinary studies of vane clusters

Abstract:

This work is part of the research aimed towards the multidisciplinary robust shape optimization of low pressure turbine (LPT) vane clusters. Here we focus on the global sensitivity analysis needed to identify the most important design variables and reduce the design parameter space for further optimization. Identifying shared important variables for different disciplines will help to find a suitable multidisciplinary optimization architecture. To deal with high computational costs associated to the multidisciplinary analysis chain, a surrogate-based approach for sensitivity analysis is proposed here. Two well known high-dimensional test functions are used to validate the accuracy of the surrogate-based sensitivity analysis. Finally the process is successfully applied to the multidisciplinary analysis of the vane cluster. The results obtained show clearly the importance of performing advanced non-linear sensitivity analysis in addition to the computation of linear correlations.

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