An overview on robust design hybrid metamodeling: Advanced methodology in process optimization under uncertainty

ABSTRACT

Nowadays, process optimization has been an interest in engineering design for improving the performance and reducing cost. In practice, in addition to uncertainty or noise parameters, a comprehensive optimization model must be able to attend other circumstances which might be imposed in problems under real operational conditions such as dynamic objectives, multi-response, various probabilistic distribution, discrete and continuous data, physical constraints to design parameters, performance cost, computational complexity and multi-process environment. The main goal of this paper is to give a general overview of topics with brief systematic review and concise discussions about the recent development of comprehensive robust design optimization methods under hybrid aforesaid circumstances. Both optimization methods of mathematical programming based on Taguchi approach and robust optimization based on scenario sets are briefly described. Metamodels hybrid robust design is discussed as an appropriate methodology to decrease computational complexity in problems under uncertainty. In this context, the authors' policy is to choose important topics for giving a systematic picture to those who wish to be more familiar with recent studies about robust design optimization hybrid metamodels, also by attending real circumstances in practice. In particular, production and project management are considered as two important methodologies that could be improved by applications of advanced robust design combining with metamodel methods.

Keyword: Robust design; Metamodeling; Uncertainty; Process optimization