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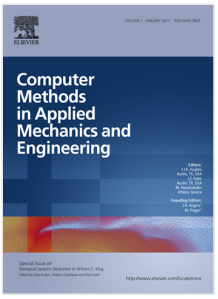

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Bayesian sparse polynomial chaos expansion for global sensitivity analysis

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Abstract

Polynomial chaos expansions are frequently used by engineers and modellers for uncertainty and sensitivity analyses of computer models. They allow representing the input/output relations of computer models. Usually only a few terms are really relevant in such a representation. It is a challenge to infer the best sparse polynomial chaos expansion of a given model input/output data set. In the present article, sparse polynomial chaos expansions are investigated for global sensitivity analysis of computer model responses. A new Bayesian approach is proposed to perform this task, based on the Kashyap information criterion for model selection. The efficiency of the proposed algorithm is assessed on several benchmarks before applying the algorithm to identify the most relevant inputs of a double-diffusive convection model.

Keywords: Global sensitivity analysis, Sobol' indices, Sparse polynomial chaos expansion, Bayesian model averaging, Kashyap information criterion, Double-diffusive convection

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