EMULATION OF TWO NESTED CODES WITH A FUNCTIONAL INTERMEDIARY VARIABLE

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Thanks to computing power increase, the certification and the conception of complex systems relies more and more on simulation. This generally requires the evaluation of numerical codes in a huge number of input points. When the computational cost is high, surrogate models are classically introduced to emulate the response of these codes [1]. In this prospect, the first specificity of this work comes from the fact that the quantity of interest can be modelled by two nested computer codes. By two nested computer codes, we mean that the outputs of the first code are inputs of the second code. Hence, dedicated surrogate models that can exploit at best this nested structure will be presented [2]. The second specificity of this work is the presence of a functional intermediary variable. Adapted reduction techniques will then be proposed to extract at best the information of this function that actually plays on the prediction of the second code output.

Moreover, adaptive strategies, which indicate to the modeller which code to call and where to call it, will be introduced to improve the accuracy of the nested code predictor at the lowest computational budget. In particular, the selection criteria will be able to integrate the fact that the computational cost associated with the evaluation of each code can be different.

The presented methods will eventually be applied to a series of numerical and industrial examples.

REFERENCES

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