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Simulation-Based Optimization Techniques for Computationally Expensive Engineering Design Problems

Special Issue of

International Journal of Mathematical Modelling and Numerical Optimisation (IJMMNO)
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The use of computer simulations is ubiquitous in contemporary engineering design. High-fidelity numerical models are very accurate but, at the same time, computationally expensive. Therefore, direct use of high-fidelity simulations in the optimization loop may be prohibitive. On the other hand, simulation-driven design is the only option in many cases due to complexity of the structure under consideration and the lack of analytical models and/or systematic design procedures. In such instances, computationally efficient design can be performed using surrogate-based optimization (SBO), where the high-fidelity model is replaced by its computationally cheap but still reasonably accurate representation, a surrogate. The surrogate model can be created using various approximation schemes. The surrogate can also be knowledge-based, i.e., constructed from the low-fidelity model enjoying the same physics as the high-fidelity one. One of the goals of SBO is to reduce the number of high-fidelity model evaluations, and, consequently, to lower the optimization cost.

This special issue of the *International Journal of Mathematical Modelling and Numerical Optimisation* (www.inderscience.com/ijmmno) focuses on the current state of the art and promotes new directions of surrogate-based and knowledge-based methodologies for efficient optimization of computationally expensive engineering problems.

Topics include (but are not limited to):

- Computationally efficient optimization of expensive objective functions;
- Simulation-driven design;
- Function-approximation-based and physics-based surrogate models;
- Surrogate-based modeling and optimization;
- Multi-fidelity analysis and optimization;
- Knowledge-based methods;
- Response surface approximation, space mapping, and response correction techniques;
- Application case studies.

This special issue will appear in November 2011. Manuscripts should conform to the requirements for regular papers of IJMMNO. All submitted papers will be peer-reviewed. Authors wishing to have their contribution considered for this issue should submit their contribution in PDF format before **December 1, 2010** to the guest editors. Please indicate your *interest of contribution* by sending a short email including the title of the paper, a short abstract (50 to 100 words) and the estimated number of pages of your paper to the guest editors by **September 1, 2010**.

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