

Volume II

SENSITIVITY
and
UNCERTAINTY
ANALYSIS

*Applications to
Large-Scale Systems*

Dan G. Cacuci
Mihaela Ionescu-Bujor
Ionel Michael Navon



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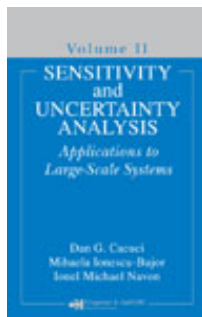
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Description

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Sensitivity and Uncertainty Analysis, Volume II: Applications to Large-Scale Systems

Dan G Cacuci *University of Karlsruhe, Germany*
Mihaela Ionescu-Bujor *Forschungszentrum Karlsruhe, Germany*
Ionel Michael Navon *Florida State University, Tallahassee, USA*



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- Includes a review of most prominent screening design methods and local and global statistical and deterministic methods
- Builds the theoretical foundation for the modular implementation of the ASAP for complex simulations systems
- Explores the application of ASAP to transient one-dimensional two-phase flow problems modeled by well-posed quasi-linear PDEs.
- Examines applications of the ASAP for sensitivity analysis of paradigm large-scales models used for numerical weather prediction and climatic research

There are many methods for performing sensitivity and uncertainty analysis. Two of the modern--and most useful--deterministic methods, the Adjoint Sensitivity Analysis Procedure (ASAP) and the Global Adjoint Sensitivity Analysis (GASAP), received detailed theoretical treatment in Volume I of this book. This volume extends the underlying theory of these methods into practice with a focus on their application to large-scale systems.

Sensitivity and Uncertainty Analysis Volume II: Applications to Large-Scale Systems begins with a review of the most prominent screening design, statistical, and deterministic methods. The authors then explore applications of the ASAP to transient one-dimensional two-phase flow problems, in particular its

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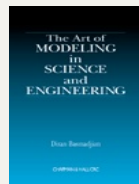
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implementation into a large-scale code that simulates the thermal-hydraulic characteristics of light water nuclear reactors. They go on to build the theoretical foundation for the modular implementation of the ASAP for complex simulations systems and present the general sensitivity theory for the response functional of a physical system defined at critical points. The remaining chapters are devoted to applications of the ASAP to sensitivity analyses of large-scale models used for numerical weather prediction and climatic research and simulation.

The examples presented clearly demonstrate the advantages of using the ASAP for large-scale systems characterized by many variables and parameters, particularly its exceptional computational efficiency. Rigorous but accessible, this book will build a thorough familiarity with ASAP and its advantages and make ASAP a valuable addition to your analytical toolbox.

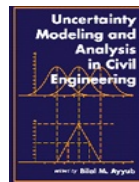
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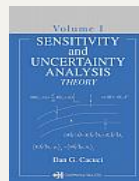

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As computer-assisted modeling and analysis of physical processes have continued to grow and diversify, sensitivity and uncertainty analyses have become indispensable investigative scientific tools. Mo [\(...more\)](#)



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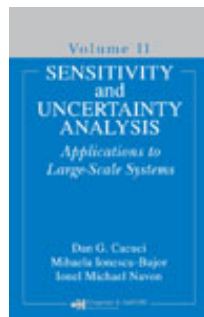
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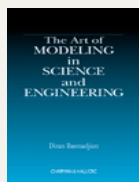
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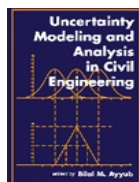
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