DESCRIPTION

Bayesian methods are a powerful tool in many areas of science and engineering, especially statistical physics, medical sciences, electrical engineering, and information sciences. They are also ideal for civil engineering applications, given the numerous types of modeling and parametric uncertainty in civil engineering problems. For example, earthquake ground motion cannot be predetermined at the structural design stage. Complete wind pressure profiles are difficult to measure under operating conditions. Material properties can be difficult to determine to a very precise level—especially concrete, rock, and soil. For air quality prediction, it is difficult to measure the hourly/daily pollutants generated by cars and factories within the area of concern. It is also difficult to obtain the updated air quality information of the surrounding cities. Furthermore, the meteorological conditions of the day for prediction are also uncertain. These are just some of the civil engineering examples to which Bayesian probabilistic methods are applicable.

- Familiarizes readers with the latest developments in the field
- Includes identification problems for both dynamic and static systems
- Addresses challenging civil engineering problems such as modal/model updating
- Presents methods applicable to mechanical and aerospace engineering
- Gives engineers and engineering students a concrete sense of implementation
- Covers real-world case studies in civil engineering and beyond, such as:
• structural health monitoring
• seismic attenuation
• finite-element model updating
• hydraulic jump
• artificial neural network for damage detection
• air quality prediction
• Includes other insightful daily-life examples
• Companion website with MATLAB code downloads for independent practice
• Written by a leading expert in the use of Bayesian methods for civil engineering problems

This book is ideal for researchers and graduate students in civil and mechanical engineering or applied probability and statistics. Practicing engineers interested in the application of statistical methods to solve engineering problems will also find this to be a valuable text.

MATLAB code and lecture materials for instructors available at http://www.wiley.com/go/yuen

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**ABOUT THE AUTHOR**

Ka-Veng Yuen is an Associate Professor of Civil and Environmental Engineering at the University of Macau. His research interests include random vibrations, system identification, structural health monitoring, modal/model identification, reliability analysis of engineering systems, structural control, model class selection, air quality prediction, non-destructive testing and probabilistic methods. He has been working on Bayesian statistical inference and its application since 1997. Yuen has published over sixty research papers in international conferences and top journals in the field. He is an editorial board member of the International Journal of Reliability and Safety, and is also a member of the ASCE Probabilistic Methods Committee, the Subcommittee on Computational Stochastic Mechanics, and the Subcommittee on System Identification and Structural Control of the International Association for Structural Safety and Reliability (IASSAR), as well as the Committee of Financial Analysis and Computation, Chinese Association of New Cross Technology in Mathematics, Mechanics and Physics. Yuen holds an M.S. from Hong Kong University of Science and Technology and a Ph.D. from Caltech, both in Civil Engineering.
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