Effective Groundwater Model Calibration: With Analysis of Data, Sensitivities, Predictions, and Uncertainty, C. Mary, Hill, R. Claire, Tiedeman. John Wiley & Sons Inc., Hoboken, NJ (2007). 471 pp., Price: US$ 89.95, ISBN: 0-471-77636-X

In this book, the authors present "...a set of methods and guidelines that can help produce more accurate transparent mathematical models. The models can represent groundwater flow and transport and other natural engineered systems." This book, the authors hope, will improve how data and models are used.

The authors note "Despite its apparent utility, in many fields, such as groundwater hydrology, the methods described in this book are not routinely used, and calibration using only trial-and-error methods is more common." The authors "...hope this text will encourage modelers to use, and resource managers to demand, the more transparent and defensible models that result from using the types of methods and ideas described in this book."

The authors state that "This book is intended for use in undergraduate and graduate classes, and is also appropriate for use as a reference book and for self-study. Minimal expertise in statistics and mathematics is required for all except a few advanced, optional topics. Knowledge of groundwater principles is needed to understand some parts of the exercises and some of the examples..."

"The primary topics of this book are (1) methods for sensitivity analysis, data assessment, model calibration, and uncertainty analysis developed on the basis of inverse modeling theory; and (2) guidelines for the effective application of these methods."

"Chapter 2 presents an overview of (1) three computer codes for inverse modeling that are used throughout the book, (2) a hypothetical groundwater management problem to which the methods are applied, and (3) exercises that use this groundwater management problem to clearly demonstrate the methods. Chapters 3–5 present methods for measuring model fit, initial model sensitivity analysis, and parameter estimation." "Chapters 6–8 present methods for evaluating model fit, parameter estimates, data needs, and prediction sensitivity and uncertainty." "Chapter 9 presents methods for calibrating transient and transport models, and for recalibrating and reevaluating existing models when new data become available." Exercises are given at the end of Chapters 3–9 to demonstrate the methods discussed in those chapters.

"Chapters 10–14 present 14 guidelines that address using the methods presented in Chapters 3–9 to analyze, simulate, calibrate, and evaluate models of complex systems." "Chapter 15 addresses the use and testing of models and guidelines."

"Most of the methods presented and referred to in the guidelines are based on linear or nonlinear regression theory." "Besides the methods and guidelines, this book emphasizes the importance of how results are presented."

"Four additional aspects of the book are the exercises, answers, software, and PowerPoint files available for teaching." A web site address is given; it includes instructions for doing the exercises and using the files directly and/or using public-domain interface and visualization capabilities. PowerPoint files designed for teaching material in the book are provided on the above-mentioned web site.

The book ends with the following four appendices: (A) objective function issues; (B) calculation details of the modified Gauss–Newton method; (C) two important properties of linear regression and the effects of nonlinearity; (D) selected statistical tables.

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6 February 2007

Available online 3 March 2007

HPLC: A Practical User's Guide, M.A. McMaster. , 2nd ed., Wiley–Interscience/John Wiley & Sons Inc., Hoboken, NJ (2007). 261 pp., US$ 74.95, ISBN: 0-471-75401-3

High-pressure liquid–solid chromatography (HPLC) is rapidly becoming the method of choice for separation and analysis in many fields, since anything that can be dissolved can be separated on some type of HPLC column.

The author's goal in writing this book was to fill a need for analysts both beginning and experienced who use or wish to use HPLC. In this book, McMaster shares his practical knowledge gained through his own work.

He has divided this book into three parts. Part 1, entitled "HPLC Primer," has the following three chapters that the author feels should allow the analyst to get his/her system operating. The three chapters in this chapter are as follows:

(1) Advantages and disadvantages of HPLC.
(2) Selecting an HPLC system.
(3) Running your chromatograph.
    Part 2 shows the analyst how to make the best use of common columns and how to keep them running. This section, entitled "HPLC Optimization," has the following chapters:
(4) Separation models.
(5) Column preparation.
(6) Column aging, diagnosis, and healing.
(7) Partition chromatography modification.
(8) "Nonpartition" chromatography.
(9) Hardware specifics.
(10) Troubleshooting and optimization.
    The last major section discusses HPLC utilization and real-world applications. McMaster discusses systematic methods development, both manual and automated, and