BOOK FLYER AND ORDER FORM

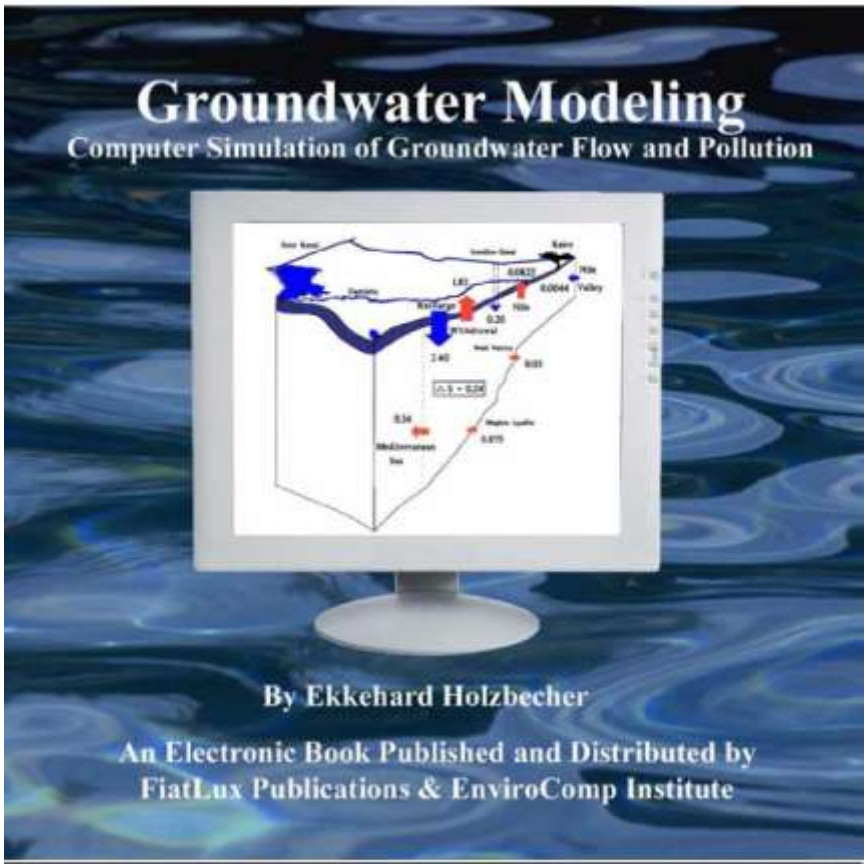
GROUNDWATER MODELING
Computer Simulation of Groundwater Flow and Pollution

An Electronic Book distributed by FiatLux Publications and the EnviroComp Institute

by Ekkehard Holzbecher

Schöneiche / Berlin (GERMANY)

http://www.igb-berlin.de/abt1/mitarbeiter/holzbecher/index.shtml



Groundwater Modeling: Computer Simulation of Groundwater Flow and Pollution is an electronic book distributed on CD-ROM. The book was authored by Ekkehard Holzbecher and published by FiatLux Publications (2298 Ocaso Camino, Fremont, California 94539, USA; email: FiatLuxPub@aol.com) and the EnviroComp Institute (www.envirocomp.org).

For updates, corrections, and discussion, please visit:
http://www.envirocomp.org/books/gwm.html

Groundwater Modeling: Computer Simulation of Groundwater Flow and Pollution is an electronic book that provides a view on the state of the art in some important areas of groundwater modeling. For the novice, it provides a comprehensive introduction and overview. For the expert, it gives some insight on special fields of application. The book focuses on deterministic modeling of groundwater phenomena.

The book is presented in Hyper Text Markup Language (HTML) and requires a browser available at the reader's site. The reader can examine this electronic book with any computer platform (PC/Mac/Unix). Navigation is straightforward.

The book is fully hypertexted and contains 5 sections, references, website pointers, information about computer codes, and a list of symbols.

© FiatLux Publications & EnviroComp Institute 2002

Table of Contents

INTRODUCTION

Preface
Groundwater as Resource
Groundwater Contamination
Pollution Pathways
Why Modeling
Modeling Levels
Model Classification

GROUNDWATER FLOW

Flow Modeling
Darcy's Law - Classical Form
Darcy's Law - Extensions
Darcy's Law - Extension for the Unsaturated Zone
Fluid Mass Balance
Fluid Sources and Sinks
Differential Equations Flow
Streamfunction Concept
Differential Equations for Unsaturated Zone

Flow Boundary Conditions
Flow Boundaries Example
Streamfunction Boundary Conditions
Numerical Approaches
Finite Differences
Finite Volumes
Finite Elements
Time Discretization
Linear Solvers
Conjugate Gradient
Nonlinear Solvers
Case Study: Plane Flow
Case Study: Vertical Cross-Section

GROUNDWATER POLLUTION

Transport Modeling
Mass Diffusion
Dispersion
Heat Diffusion
Component Mass
Balance Energy Balance
Sorption
Sorption Isotherms
Source-/Sink-Terms
Decay and/or Degradation
Differential Equations Transport
Transport Boundary Conditions
Numerical Dispersion
Method of Characteristics
Case Study: Contaminant Transport

COUPLED FLOW AND POLLUTION

Density-Driven Flow
Saltwater Intrusion
Modeling Saltwater Intrusion
Henry Problem
Nile Delta Aquifer Case Study
Multiphase Flow
Redox Reactions
Geochemistry
Law of Mass Action

SOFTWARE ASPECTS

Software Design
User Interfaces
GeoShell
Input Parameters

Online Help
Postprocessing
Numerical Postprocessing
Graphical Postprocessing
Contours
Arrow Fields
Flowpaths
FASTpath
Streamfunction Contours
Streamlines
Isochrones
Animations
Calibration & Parameter Estimation

References
Websites
Codes