ORNL/TM-13668

Center for Computational Sciences

HYDROBIOGEOCHEM: A Coupled Model of **HYDRO**logic Transport and Mixed **BIOGEOCHEM**ical Kinetic/Equilibrium Reactions in Saturated-Unsaturated Media

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Center for Computational Sciences
Publication No. 0007

Date Published: July 1998

Prepared for the
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
EX 20 10 30 2

Prepared by
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6285
Managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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ACRONYMS

CPU	Central Process Unit
FDM	Finite-Difference Method
FEM	Finite-Element Method
G-S	Gauss-Seidel iteration method
ICM	Integrated compartment method
IFDM	Integrated finite-difference method
L	Length
M	Mass
MOC	Method of Characteristics
SOR	Successive over-relaxation iteration method
SUR	Successive under-relaxation iteration method
T	time

ACKNOWLEDGMENTS

This work is funded by the Environmental Technology Partnership program of the US Department of Energy. This work is also partially supported by the ORNL Partnership in Computational Sciences (PICS) program, supported by the Department of Energy's Mathematical, Information, and Computational Sciences (MICS) Division of the Office of Computational and Technology Research. Implementation of the microbial kinetics and geochemical kinetics into this version of the HYDROGEOCHEM code was supported by The Department of Energy, Battelle Pacific Northwest Laboratory (Contract 41521224D). The present version reflects the many contributions made by a small army of colleagues. Dr. Hwai-Ping (Pearce) Cheng has provided the incorporation of multiple ion-exchange sites and multiple adsorbent components. Dr. Jing-Ru (Ruth) Cheng contributed also and performed significant debugging work on an early equilibrium version of the model.

ABSTRACT

The computer program HYDROBIOGEOCHEM is a coupled model of HYDROlogic transport and BIOGEOCHEMical kinetic and/or equilibrium reactions in saturated/unsaturated media. HYDROBIOGEOCHEM iteratively solves the two-dimensional transport equations and the ordinary differential and algebraic equations of mixed biogeochemical reactions. The transport equations are solved for all aqueous chemical components and kinetically controlled aqueous species.

HYDROBIOGEOCHEM is designed for generic application to reactive transport problems affected by both microbiological and geochemical reactions in subsurface media. Input to the program includes the geometry of the system, the spatial distribution of finite elements and nodes, the properties of the media, the potential chemical and microbial reactions, and the initial and boundary conditions. Output includes the spatial distribution of chemical and microbial concentrations as a function of time and space, and the chemical speciation at user-specified nodes.