BOOK REVIEW

of

Advances in Porous Media, Volume 2, by M. Yavuz Corapcioglu (Editor)

Rien van Genuchten
U.S. Salinity Laboratory
450 W. Big Springs Road
Riverside, CA 92507-4617

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Advances in Porous Media, Volume 2, M. Yavuz Corapcioglu, (Editor). Elsevier, Amsterdam, 1994, Ilardcover, XV + 451 pp. US $200.00, ISBN O-444-81 723-9.

This is the second volume in a series started by Elsevier in 1991 for the purpose of providing a forum for publications on advances in porous media (I presume in porous media ***"research").*** Special emphasis were to be placed on having a "unified approach by scientists coming from a variety of backgrounds: civil, mechanical, agricultural, environmental, chemical, ceramic, mining and petroleum engineering, geohydrology, soil physics, powder metallurgy and mathematics" (as quoted from the Editor's Preface). Judging from Volume 2, and also looking at Volume 1, the Editor succeeded in doing exactly that, i.e. bringing together some very diverse, yet high-quality reviews of porous media research that should appeal to readers representing a broad array of disciplines.

The unique potential of this series is best illustrated by the excellent 105 p. long first chapter; Transport of reactive solutes in soils by S.E.A.T.M. van der Zee and W.H. van Riemsdijk This chapter is the answer for those who, like me, have tried to follow Van der Zce's many, and at times somewhat repetitive, papers on subsurface solute transport as published with various modifications and extensions in different journals and for slightly different audiences. A very detailed, comprehensive analysis is given of the transport of rtaclivc solutes in heterogeneous soils and groundwaler. The chapter deals with the concepts and mathematical description of equilibrium transport, physical and chemical non-equilibrium transport, microbial degradation, diffusion in soil aggregates, sorption kinetics, non-linear sorption, ion exchange, and the intricacies of multicomponent transport modeling. In view of the obvious quality of this chapter, it is rallier unfortunate that only a handful out of the more than 450 references in this paper are from the 1990s (none dating from 1991 or later), thus suggesting that this chapter may have been gathering dust in someone's office for several years. As such, Van der Zee's more recent work on transport in physically and chemically heterogeneous subsurface systems is not discussed at all. Actually, several other chapters in this book suffer from the same problem, i.e. a lack of discussion of literature published during the past 4 years.

The second chapter, Propagating and stationary patterns in reaction-transport systems: generic mechanisms, spatial geometries and response to external fields by P. Ortoleva, Petra Foerster and John Ross, gives an intriguing 53 p. analysis of different types of two- and three-dimensional structures that can be generated in non-equilibrium, non-linear reaction-transport systems, including different mechanisms by which these phenomena develop and are sustained. While probably of interest to many having backgrounds in chemistry and chemical engineering, it was not immediately clear how the approach can be made useful also for geological and biological systems. The many references and applications in this chapter may motivate further studies of the topology and non-equilibrium aspects of reaction-transport systems. The third chapter, The anion exclusion phenomenon in the porous media flow: A review by M. Yavuz Corapcioglu and R. Lingham, gives a brief, I8 p. overview of the principles and mathematical description of ion exclusion as observed during miscible displacement of anions in especially he-textured soils having negatively charged solid surfaces. Much of the information has been known for some time, mostly stemming from soil physics research carried out in the 1960s and 1970s.

The fourth chapter, Critical concentration models for porous materials by Qiang Chen and Amos Nur, gives an exhaustive, 140 p. long description of the geophysical (mostly mechanical and acoustic) properties of porous media by mans of critical concentration models. Critical porosities or concentrations may be used to quantify the microstructure of porous rocks or sediments in terms of, for example, porosity-permeability relationships, porosity-clay relationships (for soils and sediments), effective moduli, and wave vclocitics. The authors also provide examples of how critical concentration models can be used for studying the strength of porous materials and for explaining tectonic block rotations. The fifth chapter, Electrokinetic flow processes in porous media and their applications by Albert T. Yeung and totalling some 88 pp., addresses the topics of electro-osmosis, streaming potential, electrophoresis, and sedi-

mentation or migration potential. A review of different laboratory methods for measuring electrokinetic phenomena is also included. I found this chapter to bc highly educational; the material is well written and very balanced in terms of reaching not-too-advanced readers in different disciplines. The book concludes with a worthwhile 55 p. chapter by Brian Berkowitz on Modelling flow and contaminant transport in fractured media. The chapter deals with alternative approaches for modeling water flow and solute transport in saturated fractured media, including a discussion of the geometric and hydraulic characteristics of fractures, and different mathematical models for describittg fracture networks. As pointed out by the author, many questions remain about the applicability of these models to real-world situations. Not discussed in this chapter are dual- (or double-) porosity type continuum approaches for modeling flow and transport in structured media, including those applicable to variably-saturated flow systems. It seems to me that much more has been done in this area of research than was covered by the author.

Overall, this volume has succeeded in bringing together some very useful, comprehensive analyses of porous media researclt. The reviews could help many of us who are slowly getting lost in the mountain of journals, papers and proceedings on porous media type research, being published by different professional societies and commercial outlets, and intended for different scientific disciplines. Still, I wonder how this particular series (Advances in *Porous Media)* overlaps, competes with, or tries lo replace. other attempts (by different publishers) to put out similar series, e.g. Advances in: Chromatography, Environmental Science and Engineering, Geophysics, Hydroscience (remember that one?), Irrigation, Soil Science, and Transport Processes, among others. Also, the price (US $200) is not such that many are likely to run to the book store to buy individual copies.

RIEN VAN GENUCHTEN
(Riverside, CA, USA)