Porous Media—Geometry and Transports, by PIERRE M. ADLER. Butterworth-Heineman, Boston, MA (1992). 544 pp., US $95.

It is only natural that Pierre Adler's new book on porous media should be compared to Dullien's well-known book of almost the same title, and especially so since Dullien's book has just been revised and reissued in its second edition (Dullien 1992). In his introduction, Adler mentions Dullien's first edition (among other distinguished books) and briefly contrasts the two by pointing out that, while Dullien concentrates on analysis of the geometry of real materials and stresses applications to two-phase flows, Adler discusses synthetic materials (obtained through computer simulations) and restricts discussion to single-phase flows. (For example, Dullien's book has a chapter of over 100 pages on capillarity in porous media, whereas Adler does not even mention Young's equation.)

I would characterize the two books a little differently by saying that Dullien's book is very strong on the phenomenological description and history of analysis of real porous materials and real flows, while Adler's book focuses on recent advances in understanding porous media made possible through computer simulation. This characterization may leave some readers with the impression that Adler's work in general and this book in particular are oversimplified and not applicable to real materials, but actually Adler focuses much of his research on answering exactly this criticism of his porous media simulations. He has developed the "method of reconstructed porous media" by which he means constructing particular computer generated realizations of porous media having the same statistical characteristics as those of the real materials whose behavior is to be studied. Although this approach has the obvious failing that no particular realization can represent the ensemble of realizations that possess any given set of statistical characteristics, the approach nevertheless has some real merit when used statistically (by trying many such realizations) as Adler and his colleagues have done.

To enumerate some of the major differences between these two books: The longest chapter of Adler's book (about 160 pages) is devoted to periodic porous media, whereas Dullien's book neglects these models altogether. Both books mention fractals, but Adler's 120-page chapter on the topic dwarfs Dullien's 8 pages. Dullien devotes less than 20 pages to percolation theory, whereas Adler discusses it extensively in Chapter 6 on random porous media. Adler includes a brief discussion of variational bounds on transport properties, but Dullien completely ignores this promising area of research. And we have already mentioned the fact that Dullien gives extensive discussion of capillarity and multiphase flow, whereas Adler treats only single-phase flow (including diffusion of solute, heat conduction, convection and Taylor dispersion).

Although there is some overlap between the two books, the differences are clearly greater than the similarities. Dullien's book is much richer in the variety of physical phenomena discussed. Adler's book is much more thorough and precise in its derivations and references to the recent theory. I believe both books are valuable and quite complementary references.

Adler's book gives a good introduction to the recent theoretical and computer simulation work on geometry and flows in porous media. References seemed disappointingly incomplete to me for a book of this size, but tend nevertheless to include at least one classic reference and one good recent reference on each topic covered so the interested reader can fill in the gaps by a thorough review of the intervening literature. I can strongly recommend the book to anyone who is about to start doing theoretical work or simulations in this field, or to experimentalists who want an up-to-date but not too detailed account of our current incomplete understanding of transport in porous media.

REFERENCES

DULLIEN, F. A. L. 1992 *Porous Media—Fluid Transport and Pore Structure.* Academic Press, San Diego, CA.

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