

The author states that "the book can be used as a graduate textbook in a three-phase fluidization engineering course or as a supplement textbook to a general fluidization engineering course". The occurrence of such specialized courses in graduate curricula is likely to be rare, and accordingly, it will find limited use as a textbook. Perhaps this is just as well, since in this reviewer's opinion, it would be difficult to teach from this book. In contrast to other, successful, textbooks on fluidization, the subject is not developed from any firm pedagogical basis which is supported by theory and experimental observation. Rather, the text is a wide-ranging compendium of descriptive material that is occasionally so broad and uneven in its treatment that the reader is unable to fit the written text into any sort of overall scheme or general framework. However, the broad coverage is likely to be very valuable to research engineers who need access to information about the behavior of three-phase reactor systems and to the background literature. Anyone seriously interested in the study or design of three-phase fluidized beds should own a copy of this book.

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Handbook of Hydraulic Resistance, by I. E. Idelchik (Edited by E. Fried). Hemisphere, Washington, D. C. (1986). 640 pp. ISBN 0-89116-284-4. \$90.

The present edition of the *Handbook of Hydraulic Resistance* is a translation of the second Russian edition of 1975. The author claims that it differs markedly from the Russian first edition of 1960.

The first English edition of 1966 (*Handbook of Hydraulic Resistance*, Israel Program of Scientific Translations, Jerusalem, 1966) has been extensively used by engineers in English-speaking countries because there existed no English-language counterpart to this book.

The book is extremely detailed and has many illustrations of flow passages and diagrams and tables for pressure drop or pressure loss coefficients, which are so useful for the practising engineer in designing single-phase flow systems.

The book is based primarily on the Russian literature with very few references to Western literature. The non-Russian references are all pre-1970. A very useful book to have!

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Fluid Dynamics and Flow-induced Vibrations of Tube Banks, by A. Zukauskas, R. Ulinskas and V. Katinas (Edited by J. Karni). Hemisphere, Washington, D. C. (1988). 290 pp. ISBN 89116-686-6. \$85.50.

This book is essentially a compilation of flow research performed in the Soviet Union on the characteristics of single-phase flow that lead to the vibration in heat exchanger tube bundles. This is the strength of the book. It is usually difficult for engineers outside the Soviet Union to access up-to-date Soviet scientific efforts. With this book, heat exchanger research engineers dealing with tube bundle flow phenomena can find in one source an excellent presentation of Soviet efforts.

It appears that considerable effort has been expended by Soviet researchers in attempting to experimentally determine flow details around individual tubes within bundles of varying geometric characteristics operating under a range of flow conditions. For example, considerable discussion and copious experimental results are presented on the effects of pitch, tube bundle geometry, such as staggered, in-line, radial etc., tube location within the bundle on the tube boundary layer separation point, tube to tube gap velocity distribution and tube circumferential pressure distribution. Also, considerable information is presented on the drag of various tube bundle geometries and the drag on individual tubes within a bundle as a function of flow and bundle