BOOK REVIEW

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Multiphase Science and Technology, Volume 6

Editors	G. F. Hewitt, J. M. Delhaye, and N. Zuber
Publisher	Hemisphere Publishing Corporation (1991)
Pages	813
Price	$165.00
Reviewer	Mujid S. Kazimi

Over the last two decades, there has been a significant growth in the number of numerical models to predict the behavior of two-phase flows under a variety of conditions. This proliferation of methods has made it very difficult to continue to appreciate the essential advances of this science, as well as the current state of development of versatile and robust two-phase flow computer codes. The sixth volume in this series on multiphase science and technology is meant to present the results of the comparison of various models against qualified benchmark physical and numerical tests. It does, but that comparative presentation is much too fragmented. Unfortunately, the reader who is looking for insights that draw on the totality of the results would be deeply disappointed. This volume should have been clearly represented as a compilation of results, not a comparative analysis, of the application of the models to a wide range of conditions.

The volume is divided into four parts. In part 1, ten physical benchmark exercises are described. This set was a select group among those presented at an international workshop held in 1987, which itself was a followup on a previous workshop held in 1985. Most of the data sets presented in the first part had already been published in Vol. 3 of the series. Thus, the comparative standing of the methods should have been the focus of attention. Yet, only for two of the ten data sets do we find more than five model comparisons. Only one or two models have been exercised for the majority of the other sets. In part 2, 12 new sets of physical data are provided. This is to complement the 18 sets available in Vol. 3. To show how this collection covers the field, the 30 data sets are classified with respect to phase change and geometry. Model comparisons for the new sets of data are not presented. In part 3, the results of code applications to 14 numerical data sets are provided. Here, the data sets are classified as one- or two-dimensional and as steady-state or transient. There is a heavy emphasis on the numerical solutions, not the physical models they represent. In part 4, a brief description of the physical model and numerical scheme in the codes used is given.

The availability of well-qualified physical and numerical reference problems in one volume is a valuable reference for the field. On the other hand, it would have been more insightful to the readers if the editors or "collators" of each of the parts attempted to better rationalize the selection of these data sets. In other words, the reader is not told why this group of data is selected to cover the field or even any desired portion of it. In fact, in each chapter, the field is mapped using a different classification scheme. Furthermore, to the extent that the codes used are not preselected to cover a consistent set, it is hard to interpret the comparative results. The apparent differences may be due to the number of conservation equations, the internal closure laws, or the numerical approaches. There is no way to tell this from the book. It would have been useful to add an expanded overview chapter to convey the generic lessons learned from this very difficult undertaking. As it stands, the only obvious presentation is the data set by data set comparison of the particular codes used for the calculation. As the power of computers continues to grow exponentially, it would be useful for the next phase of multiphase modelers and computer writers to know whether the shortcomings of today's codes are physics based or numerically based. The fact is, both aspects can be further developed but one cannot tell from this book what direction should be followed.

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