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## Preface

*Applied Hydraulic Transients* covers transient flow in closed conduits and in open channels in a systematic and comprehensive manner from introduction to advanced level, with an emphasis on the presentation of efficient and robust computational procedures for analysis and simulation. These procedures, based on modern numerical methods, are suitable for machine computations, provide more accurate results as compared to the available traditional methods and allow the analysis of large and complex systems. The field of application is very broad and diverse and covers systems, such as hydroelectric power plants, pumped storage schemes, water-supply systems, oil pipelines, cooling-water and industrial piping systems. The book is suitable as a reference for practicing engineers and researchers and as a text for senior-level undergraduate and graduates students.

Because of diverse nature, the material in each chapter is presented more or less as stand-alone. Practical applications are emphasized throughout by including case studies of real-life projects, problems of applied nature and photographs and design criteria. Design charts and empirical formulas are presented in the appendix for approximate analyses and for comparing different alternatives for feasibility studies and preliminary design and for the selection of parameters for detailed analyses. Solved examples and sample computer programs are included to facilitate learning. SI units are used throughout. However, equivalent values of empirical constant in the Customary English units are provided which should allow the use of these units without much difficulty.

The general sequence of presentation in this third edition is similar to that in the earlier editions. However, revisions are made throughout for clarity and the references are updated. A new chapter on leak and partial blockage detection is added. In each chapter, a chapter-opener photograph is included as an illustrative introduction to the chapter. In Chapter 1, the historical background is updated and a section on wave reflection and transmission is added. A new section introduces the

inclusion of unsteady friction in the governing equations in Chapter 2 and the simulation of unsteady friction and the application of higher-order numerical methods are presented in Chapter 3. Coverage of the modeling of pump turbines is expanded in Chapter 5. A new section in Chapter 8 outlines the determination of the functional significance of stenosis in cardiovascular systems. The material in Chapters 10, 11, and 13 is revised and a new Chapter 12 discusses the detection of leaks and partial blockages in pipelines. Design charts and other data are presented in Appendix A and sample computer programs in FORTRAN along with sample input and output data are included in Appendices B through E.

I have used Chapters 1 through 5 and 10 as a textbook for a three-credit graduate course on hydraulic transients at Old Dominion University, Washington State University and University of South Carolina. Different chapters or parts thereof may be used for instructional material for advanced level, specialized courses and workshops.

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