

Plate Heat Exchangers

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International Series on Developments in Heat Transfer

Objectives

The Developments in Heat Transfer book Series publishes state-of-the-art books and provides valuable contributions to the literature in the field of heat transfer. The overall aim of the Series is to bring to the attention of the international community recent advances in heat transfer by authors in academic research and the engineering industry.

Research and development in heat transfer is of significant importance to many branches of technology, not least in energy technology. Developments include new, efficient heat exchangers, novel heat transfer equipment as well as the introduction of systems of heat exchangers in industrial processes. Application areas include heat recovery in the chemical and process industries, and buildings and dwelling houses where heat transfer plays a major role. Heat exchange combined with heat storage is also a methodology for improving the energy efficiency in industry, while cooling in gas turbine systems and combustion engines is another important area of heat transfer research.

To progress developments within the field both basic and applied research is needed. Advances in numerical solution methods of partial differential equations, high-speed, efficient and cheap computers, advanced experimental methods using LDV (laser-doppler-velocimetry), PIV (particle-image-velocimetry) and image processing of thermal pictures of liquid crystals, have all led to dramatic advances during recent years in the solution and investigation of complex problems within the field.

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Preface

Heat exchangers are important, and used frequently in the processing, heat and power, air-conditioning and refrigeration, heat recovery, transportation and manufacturing industries. Such equipment is also important in electronics cooling and for environmental issues like thermal pollution, waste disposal and sustainable development. Various types of heat exchangers exist. In textbooks of heat transfer, commonly a brief chapter is provided for the introduction of heat exchangers and elementary theory of design, rating and sizing are presented. There also exist many books on heat exchangers either as textbooks or edited volumes. However, most such books treat a variety of heat exchanger types or specific problems and do not specialize in any particular heat exchanger type. Therefore, a lack of comprehensive and in-depth textbooks on specific heat exchangers exists.

The present book concerns plate heat exchangers (PHEs), which are one of the most common types in practice. The overall objectives are to present comprehensive descriptions of such heat exchangers and their advantages and limitations, to provide in-depth thermal and hydraulic design theory for PHEs, and to present state-of-the-art knowledge.

The book starts with a general introduction and historical background to PHEs, then discusses construction and operation (PHE types, plate pattern, etc.) and gives examples of PHEs in different application areas. Material issues (plates, gaskets, brazing materials) and manufacturing methods are also treated. The major part of the book concerns the basic design methods for both single-phase and two-phase flow cases, various flow arrangements, thermal-hydraulic performance in single-phase flow and for PHEs operating as condensers and evaporators. Fouling problems are also discussed and in a section on extended design and operation issues, modern Research and Development (R & D) tools like computational fluid dynamics (CFD) methods are discussed. Unique features for PHEs are discussed throughout.

Extensive R & D activities are carried out at companies and universities worldwide and originally this book was intended as an edited volume reflecting current research and state-of-the-art. However, as time elapsed and the lack of a comprehensive textbook was identified, the objectives were changed.

We believe this book will be useful as both a textbook at various educational levels and as a reference source book for PHEs.

We are grateful to the companies providing us with a lot of information on their products and their R & D works. We also appreciate the cooperation and patience provided by the staff at WIT Press and for their encouragement and assistance in producing this book.

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