PREFACE TO THE FIRST RUSSIAN EDITION

Heat exchangers and other thermal equipment are widely used in different branches of technology: power engineering, chemical, petroleum refining and food processing industries, refrigerating and cryogenic technology, heat engines, transport, aviation and space technology.

One of the promising ways of developing efficient compact heat exchangers is the use of highly efficient heat transfer surfaces and modern methods of heat transfer enhancement in flow channels. Therefore, a good selection of highly efficient heat transfer surfaces is one of the most urgent problems.

The number of publications dealing with heat transfer enhancement is constantly growing. However, results of these studies are often contradictory, the suggested methods of enhancement are not always effective or adaptable to streamlined production. In many cases the choice of the method of enhancement is not substantiated and has a random character.

This explains the slow adaptation of highly efficient heat transfer surfaces which undoubtedly leads to large economic losses and impedes the improvement of products and reduction in the use of metal in their construction.

The authors hope that this book will not only help engineers to reliably select effective heat transfer surfaces in heat exchangers and devices, but also makes it possible to calculate the heat transfer and hydraulic resistance when effective methods of heat transfer enhancement are used.

The present book differs from those published earlier since main attention is here paid to a detailed physical analysis of thermal and hydrodynamic processes occurring in the interaction between coolants and heat transfer surfaces within the framework of the suggested models and to the validation of the choice of most efficient heat transfer surfaces for existing heat exchangers.

The book is the result of systematized analytical and experimental studies in these fields, conducted by the authors over many years. The results of the study of the effect of the entire set of surface properties in heat and mass transfer are considered using the laws governing the heat exchange of surfaces of real solid bodies with gases, liquids, and multiphase flows, as well as modern concepts of macro- and microstructure of heat transfer surfaces. The problems of optimization of heat transfer surfaces with convective flows, vapor generators and converters of solar radiation are considered systematically. Special attention is paid to the studies of heat transfer surfaces to ensure high densities of heat fluxes at high velocities and low pressures and for new types of coolants as well as other urgent problems in the development of new technologies.

The book is intended for scientists and engineers who are involved in the study and design of heat exchangers and other thermal equipment in various fields of technology (power engineering, machine construction, cryogenic and refrigerating technology, transportation, etc.) and various branches of industry and also for teachers, post-graduate students, and students graduating from polytechnical universities.

The authors will be grateful for any comments and wishes directed to the improvement and comprehension of the problems considered in the book.

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