Design Development And Heat Transfer Analysis Of A Triple

This highly recommended book on transport phenomena shows readers how to develop mathematical representations (models) of physical phenomena. The key elements in model development involve assumptions about the physics, the application of basic physical principles, the exploration of the implications of the resulting model, and the evaluation of the degree to which the model mimics reality. This book also expose readers to the wide range of technologies where their skills may be applied.

Heat transfer is the exchange of heat energy between a system and its surrounding environment, which results from a temperature difference and takes place by means of a process of thermal conduction, mechanical convection, or electromagnetic radiation. Advances in Heat Transfer is designed to fill the information gap between regularly scheduled journals and university-level textbooks by providing in-depth review articles over a broader scope than is allowable in either journals or texts.

Good,No Highlights,No Markup,all pages are intact, Slight Shelfwear,may have the corners slightly dented, may have slight color changes/slightly damaged spine.

Heat Exchanger Design GuideA Practical Guide for Planning, Selecting and Designing of Shell and Tube ExchangersButterworth-Heinemann

This book is students friendly. It also demonstrates how to solve the industry related problems that crop up in Chemical Engineering Practice. The chapters are organized in a simple way that enables the students to acquire an in depth understanding of the subject. The emphasis is given to the Basic concept of heat transfer, conduction, Insulations, Convection, Extended surface-Fins, Dimensionless group and Dimensional analysis, Heat transfer analogy, Heat transfer with phase change, Heat transfer equipments, Design of heat transfer equipments and Radiation, all coming under the realm of Process Heat Transfer. Apart from the numerous illustrations, the book contains review questions, exercises and aptitude test in Chemical Engineering which bridge the gap between theoretical learning and practical implementation. All numerical problems are solved in a systematic manner to reinforce the understanding of the concepts. This book is primarily intended as a text book for the under graduate students of Chemical Engineering. It will also be useful for other allied branches such as, Aeronautical Engineering, Mechanical Engineering, Petro Chemical, Polymer Science and Engineering, Bio-technology as well as Diploma in Chemical Engineering.

Process Heat Transfer is a reference on the design and implementation of industrial heat exchangers. It provides the background needed to understand and master the commercial software packages used by professional engineers in the design and analysis of heat exchangers. This book focuses on types of heat exchangers most widely used by industry: shell-and-tube exchangers (including condensers, reboilers and vaporizers), air-cooled heat exchangers and double-pipe (hairpin) exchangers. It provides a substantial introduction to the design of heat exchanger networks using pinch technology, the most efficient strategy used to achieve optimal recovery of heat in industrial processes. Utilizes leading commercial software. Get expert HTRI Xchanger Suite guidance, tips and tricks previously available via high cost professional training sessions. Details the development of initial configuration for a heat exchanger and how to systematically modify it to obtain an efficient final design. Abundant case studies and rules of thumb, along with copious software examples, provide a complete library of reference designs and heuristics for readers to base their own designs on.

Handbook for Transversely Finned Tubes Heat Exchangers Design contains detailed experimental data, correlations, and design methods for designing and improving the performance of finned tube heat exchangers. It covers the three main types, circular finned, square finned, and helical finned tube bundles. Based on extensive experimental studies and tested at leading design and research institutions, this handbook provides an extensive set of materials for calculating and designing convective surfaces from transversely finned tubes, with a particular emphasis on power plant applications. Provides a design manual for calculating heat transfer and aerodynamic resistance of convective heating surfaces fabricated in the form of tube bundles with transverse circular, square and helical fins Presents calculations for finned surfaces operating under conditions of clean and dust-laden flows alike, including finned convective heating surfaces of boilers Includes a fully solved exercise at the end of the book, illustrating the top-down approach specially oriented to power plant heat exchangers

Researchers, practitioners, instructors, and students all welcomed the first edition of Heat Exchangers: Selection, Rating, and Thermal Design for gathering into one place the essence of the information they need-information formerly scattered throughout the literature. While retaining the basic objectives and popular features of the bestselling first edition, the second edition incorporates significant improvements and modifications. New in the Second Edition: Introductory material on heat transfer enhancement An application of the Bell-Delaware method New correlation for calculating heat transfer and friction coefficients for chevron-type plates Revision of many of the solved examples and the addition of several new ones The authors take a systematic approach to the subject of heat exchanger design, focusing on the fundamentals, selection, thermohydraulic design, design processes, and the rating and operational challenges of heat exchangers. It introduces thermal design by describing various types of single-phase and two-phase flow heat exchangers and their applications and demonstrates thermal design and rating processes through worked examples, exercises, and student design projects. Much of the text is devoted to describing and exemplifying double-pipe, shell-and-tube, compact, gasketed-plate heat exchanger types, condensers, and evaporators.

A heat exchanger is a device designed to efficiently transfer or ""exchange"" heat from one matter to another. When a fluid is used to transfer heat, the fluid could be a liquid, such as water or oil, or could be moving air. They are widely used in space heating, refrigeration, air conditioning, power stations, chemical plants, petrochemical plants, petroleum refineries, natural-gas processing, and sewage treatment. The most well-known type of heat exchanger is a car radiator. In a radiator, a solution of water and ethylene glycol, also known as antifreeze, transfers heat from the engine to the radiator and then from the radiator to the ambient air flowing through it. This process helps to keep a car's engine from overheating. For efficiency, heat exchangers are designed to maximize the surface area of the wall between the two fluids, while minimizing resistance to fluid flow through the exchanger. The exchanger's performance can also be affected by the addition of fins or corrugations in one or both directions, which increase surface area and may channel fluid flow or induce turbulence.Heat Exchangers - Basics Design Applications offers comprehensive information on particular cases of heat exchangers. Beside the questions of thermodynamic basics, the book discourses numerous important issues, such as conceptions, design, operations, fouling and cleaning of heat exchangers. The book is not inevitably anticipated to be an elementary source of the knowledge in the area it covers, but moderately a guide while pursuing detailed solutions of specific technical problems which face engineers and technicians engaged in research and development in the fields of heat transfer and heat exchangers.

First Published in 1994. Routledge is an imprint of Taylor & Francis, an informa company.

Presenting contributions from renowned experts in the field, this book covers research and development in fundamental areas of heat exchangers, which include: design and theoretical development, experiments, numerical modeling and simulations. This book is intended to be a useful reference source and guide to researchers, postgraduate students, and engineers in the fields of heat exchangers, cooling, and thermal management.

A guide to two-phase heat transfer theory, practice, and applications Designed primarily as a practical resource for design and development engineers, Two-Phase Heat Transfer contains the theories and methods of two-phase heat transfer that are solution oriented. Written in a clear and concise manner, the book includes information on physical phenomena, experimental data, theoretical solutions, and empirical correlations. A very wide range of real-world applications and formulas/correlations for them are presented. The two-phase heat transfer systems covered in the book include boiling, condensation, gas-liquid mixtures, and gas-solid mixtures. The authora noted expert in this fieldalso reviews the numerous applications of two-phase heat transfer such as heat exchangers in refrigeration and air conditioning, conventional and nuclear power generation, solar power plants, aeronautics, chemical processes, petroleum industry, and more. Special attention is given to heat exchangers using mini-channels which are being increasingly used in a variety of applications. This important book: Offers a practical guide to two-phase heat transfer Includes clear guidance for design professionals by identifying the best available predictive techniques Reviews the extensive literature on heat transfer in two-phase systems Presents information to aid in the design and analysis of heat exchangers. Written for students and research, design, and development engineers, Two-Phase Heat Transfer is a comprehensive volume that covers the theory, methods, and applications of two-phase heat transfer.

Problems in thermal design are encountered in a vast array of fields, from manufacturing equipment to energy systems and consumer products to scientific aparatuses. The tools to achieve the solutions to these problems lie within this handbook. Written for the non-specialist, this comprehensive resource addresses the use and control of thermal phenomena in both products and processes. With contributions from leading experts in the field, this book gives a foundation to the four principal facets of thermal design: heat transfer analysis, materials performance, heating and cooling technology, and instrumentation and control. The focus is on providing practical thermal design and development guidance across the spectrum of problem analysis, material applications, equipment specification, and sensor and control selection. Professional in thermal design, heat transfer, and mechanical engineering will find this handbook invaluable.

The objective of this project is the development of a preliminary design for a full-sized, closed cycle, ammonia power system module for the 100 MWe OTEC Demonstration Plant. In turn, this Demonstration Plant is to demonstrate, by 1984, the operation and performance of an ocean thermal power plant having sufficiently advanced heat exchanger design to project economic viability for commercial utilization in the late 1980's and beyond. Included in this power system development are the preliminary designs for a proof-of-concept pilot plant and test article heat exchangers which are scaled in such a manner as to support a logically sequential, relatively low-cost development of the full-scale power system module. The conceptual designs are presented for the Demonstration Plant power module, the proof-of-concept pilot plant, and for a pair of test article heat exchangers. Costs associated with the design, development, fabrication, checkout, delivery, installation, and operation are included. The accompanying design and producibility studies on the full-scale power system module project the performance/economics for the commercial plant. This section of the report describes the full-size power system module, and summarizes the design parameters and associated costs for the Demonstration Plant module (prototype) and projects costs for commercial plants in production. The material presented is directed primarily toward the surface platform/ship basic reference hull designated for use during conceptual design; however, other containment vessels were considered during the design effort so that the optimum power system would not be unduly influenced or restricted. (WHK).

Heat pipes are used in a wide range of applications, including electronics cooling, die-casting and injection moulding, heat recovery and energy conservation, de-icing and manufacturing process temperature control, and in domestic appliances. An essential guide for practicing engineers and an ideal text for postgraduate students, the book takes a highly practical approach to the design and selection of heat pipes. It is both a useful sourcebook and an accessible introduction for those approaching the topic for the first time. Contains all information necessary to design and manufacture Heat Pipes Provides a highly practical reference for engineers and graduate students Extensively revised and expanded, including increased coverage of key electronics cooling application as well as a brand new design guide

Plate-and-frame heat exchangers (PHEs) are used in many different processes at a broad range of temperatures and with a variety of substances. Research into PHEs has increased considerably in recent years and this is a compilation of knowledge on the subject. Containing invited contributions from prominent and active investigators in the area, it should enable graduate students, researchers, and research and development engineers in industry to achieve a better understanding of transport processes. Some guidelines for design and development are also included.

Many new concepts in designing and fabricating thermal management materials (TMMs) were explored to make an efficient meso-scale heat exchanger. The proposed TMMs have multi-functionality that combines structural material with cooling components by utilizing embedded microstructures in a miniature-sized body to enhance heat and mass transfer, chemical reactions etc. 'Mesomachines' are expected to provide a number of important functions where a premium is placed on mobility, compactness, or point application. More specifically, we are designing and fabricating micro-textured (Functionally Graded Material (FGM)) and micro-configured (for cooling channels) medium to compensate thermal gradient loading as a result of heat transfer into a cooling fluid circulating in the network of channels and manifolds. Previous work [Kwon et al., 1994, Kwon and Dharan, 1995] attest to the motivation for such medium. For the complicated structure with cooling channels such as our heat exchanger, finite element (FE) modeling provides the flexibility needed to design an optimal gradiency in properties by analyzing not only the magnitude of heat transfer into the fluid flow but also the integrity of the structure.

In this work a simplified transient heat transfer resistance fouling measurement apparatus was designed and a simplified analysis protocol was formulated. The design of the apparatus was optimized through first order parametric modeling and finite difference modeling of the system.

The primary objective in any engineering design process has to be the elimination of uncertainties. In thermal design of heat exchangers there are presently many stages in which assumptions in mathematical solution of the design problem are being made. Accumulation of these assumptions may introduce variations in design. The designer needs to understand where these inaccuracies may arise, and strive to eliminate as many sources of error as possible by choosing design configurations that avoid such problems at source. In this exciting text, the author adopts a numerical approach to the thermal design of heat exchangers, extending the theory of performance evaluation to the point where computer software may be written. The first few chapters are intended to provide a development from undergraduate

studies regarding the fundamentals of heat exchanger theory and the concepts of direct sizing. Later chapters on transient response of heat exchangers and on the related single-blow method of obtaining experimental results should also interest the practicing engineer. Theory is explained simply, with the intention that readers can develop their own approach to the solution of particular problems. This book is an indispensable reference text for higher level (post-graduate) students and practicing engineers, researchers and academics in the field of heat exchangers. Includes a whole new chapter on exergy and pressure loss Provides in the first few chapters a development from undergraduate studies regarding the fundamentals of heat exchanger theory, and continues in later chapters to discuss issues such as the transient response of heat exchangers and the related single-blow method of obtaining experimental results that are also of interest to the practicing engineer. Adopts a numerical approach to the thermal design of heat exchangers, extending the theory of performance evaluation to the point where computer software may be written Contributes to the development of the direct ‘sizing’ approach in thermal design of the exchanger surface Explains theory simply, with the objective that the reader can develop their own approach to the solution of particular problems

The volumetric receiver is an advanced solar central receiver concept designed to produce high temperature air. This document presents the results of a heat transfer and performance evaluation of the volumetric receiver concept. The volumetric receiver consists of an array of ceramic fins or fibers arranged in concentric rows around a central manifold. Solar energy is absorbed on the fins or fibers and is used to heat ambient air which is drawn into the receiver by an induced draft fan. The unusual features of the volumetric receiver required the development of analytical models for radiation heat transfer, convection and receiver performance. Radiation heat transfer was calculated using a Monte Carlo model where an innovative numerical scheme was used to improve computation speed. Convective heat transfer correlations used were obtained from a review of existing literature. The receiver performance was predicted using a transient simulation which calculated the equilibrium temperature distribution. The results of an extensive parametric investigation of five volumetric receiver design variations are reported and the most attractive design is identified. This design consists of a large number of small diameter ceramic fibers enclosed in a shroud. Convection from the fibers is enhanced by inducing a swirl in the incoming ambient air. The combination of small ceramic fibers and the induced swirl produces very efficient heat transfer. Performance results showed that the volumetric receiver has a predicted efficiency of 86% as compared to other high temperature receivers where the efficiency is estimated to be 81%.

Heat Exchanger Design Guide: A Practical Guide for Planning, Selecting and Designing of Shell and Tube Exchangers takes users on a step-by-step guide to the design of heat exchangers in daily practice, showing how to determine the effective driving temperature difference for heat transfer. Users will learn how to calculate heat transfer coefficients for convective heat transfer, condensing, and evaporating using simple equations. Dew and bubble points and lines are covered, with all calculations supported with examples. This practical guide is designed to help engineers solve typical problems they might encounter in their day-to-day work, and will also serve as a useful reference for students learning about the field. The book is extensively illustrated with figures in support of the text and includes calculation examples to ensure users are fully equipped to select, design, and operate heat exchangers. Covers design method and practical correlations needed to design practical heat exchangers for process application Includes geometrical calculations for the tube and shell side, also covering boiling and condensation heat transfer Explores heat transfer coefficients and temperature differences Designed to help engineers solve typical problems they might encounter in their day-to-day work, but also ideal as a useful reference for students learning about the field

This book provides engineers with the tools to solve real-world heat transfer problems. It includes advanced topics not covered in other books on the subject. The examples are complex and timely problems that are inherently interesting. It integrates Maple, MATLAB, FEHT, and Engineering Equation Solver (EES) directly with the heat transfer material.

This book serves as an extensive practice manual for the understanding and practice of heat exchanger design fundamentals and principles. It also provides a useful resource to upper undergraduate students, who are required to complete final year design projects as part of graduation. The book complements other key topics in science and engineering courses well, such as the branch of thermodynamics which relates closely to the core design principles for heat exchanger networks (FThis book serves as an extensive practice manual for the understanding and practice of heat exchanger design fundamentals and principles. It also provides a useful resource to upper undergraduate students, who are required to complete final year design projects as part of graduation. The book complements other key topics in science and engineering courses well, such as the branch of thermodynamics which relates closely to the core design principles for heat exchanger networks (First and Second Laws of Thermodynamics). Provides balanced content with numerical and open-ended problems; Tailored to the needs of students and teachers; Concise yet rigorous treatment of concepts; Incorporates use of visuals to aid learning; Reinforces engineering concepts in real-life applications.

Several applications, including those in the energy sector that require high thermal efficiency, such as those in the solar energy industry, require a careful thermal analysis of heat exchange components. In this regard, thermal resistance is a major cause of exergy destruction and must be minimised as much as possible, but also adequately designed. In the past, a number of correlations have been developed to predict heat transfer coefficients in compact heat exchangers. The designers of such heat exchangers often exploit the development of thermal boundary layers to achieve higher overall efficiency due to increases in local heat transfer coefficients. However, most of the correlations that have been developed for heat exchangers neglect the specific effect of the thermal boundary layer development in the inlet region, and instead only offer effective average heat transfer coefficients, which most users assume to be constant throughout the heat exchanger. This is often an over-simplification and leads to over-designed heat exchangers. In this study, focus is placed on annular flow passages with uniform heating on the inner wall. This geometry has many applications. This study aims to collect experimental heat transfer data for water at various flow rates and inlet geometries, to process the data and determine local and overall heat transfer coefficients, and to develop an improved local heat transfer coefficient correlation. Experimental tests were performed on a horizontal concentric tube-in-tube heat exchanger with a length of 1.05 m and a diameter ratio of 0.648. The surface of the inner tube was treated with thermochromic liquid crystals (TLCs), which allowed for high-resolution temperature mapping of the heated surface when combined with an automated camera position system in order to determine local heat transfer coefficients. Conventional in-line and out-of-line annular inlet

configurations were evaluated for Reynolds numbers from 2 000 to 7 500, as well as the transition from laminar to turbulent flow for a single in-line inlet configuration. It was found that the local heat transfer coefficients were significantly higher at the inlets, and decreased as the boundary layers developed. With the high resolution of the results, the local heat transfer coefficients were investigated in detail. Local maximum and minimum heat transfer coefficients were identified where the thermal boundary layers merged for high turbulent flow cases. The annular inlet geometries only influenced the heat transfer for Reynolds numbers larger than 4 000, for which larger inlets are favoured. Out-of-line inlet geometries are not favoured for heat transfer. A new heat transfer correlation was developed from the experimental data, based on an existing heat transfer correlation for turbulent flow in an annular flow passage, considering the boundary layer development. The new correlation estimated the area-weighted heat transfer coefficients within 10% of the experimental data and closely followed trends for local heat transfer coefficients.

A comprehensive and rigorous introduction to thermal system designfrom a contemporary perspective Thermal Design and Optimization offers readers a lucid introductionto the latest methodologies for the design of thermal systems andemphasizes engineering economics, system simulation, andoptimization methods. The methods of exergy analysis, entropygeneration minimization, and thermoeconomics are incorporated in anevolutionary manner. This book is one of the few sources available that addresses therecommendations of the Accreditation Board for Engineering andTechnology for new courses in design engineering. Intended forclassroom use as well as self-study, the text provides a review offundamental concepts, extensive reference lists, end-of-chapterproblem sets, helpful appendices, and a comprehensive case studythat is followed throughout the text. Contents include: * Introduction to Thermal System Design * Thermodynamics, Modeling, and Design Analysis * Exergy Analysis * Heat Transfer, Modeling, and Design Analysis * Applications with Heat and Fluid Flow * Applications with Thermodynamics and Heat and Fluid Flow * Economic Analysis * Thermoeconomic Analysis and Evaluation * Thermoeconomic Optimization Thermal Design and Optimization offers engineering students,practicing engineers, and technical managers a comprehensive andrigorous introduction to thermal system design and optimizationfrom a distinctly contemporary perspective. Unlike traditionalbooks that are largely oriented toward design analysis andcomponents, this forward-thinking book aligns itself with anincreasing number of active designers who believe that moreeffective, system-oriented design methods are needed. Thermal Design and Optimization offers a lucid presentation ofthermodynamics, heat transfer, and fluid mechanics as they areapplied to the design of thermal systems. This book broadens thescope of engineering design by placing a strong emphasis onengineering economics, system simulation, and optimizationtechniques. Opening with a concise review of fundamentals, itdevelops design methods within a framework of industrialapplications that gradually increase in complexity. Theseapplications include, among others, power generation by large andsmall systems, and cryogenic systems for the manufacturing,chemical, and food processing industries. This unique book draws on the best contemporary thinking aboutdesign and design methodology, including discussions of concurrentdesign and quality function deployment. Recent developments basedon the second law of thermodynamics are also included, especiallythe use of exergy analysis, entropy generation minimization, andthermoeconomics. To demonstrate the application of important designprinciples introduced, a single case study involving the design ofa cogeneration system is followed throughout the book. In addition, Thermal Design and Optimization is one of the best newsources available for meeting the recommendations of theAccreditation Board for Engineering and Technology for more designemphasis in engineering curricula. Supported by extensive reference lists, end-of-chapter problemsets, and helpful appendices, this is a superb text for both theclassroom and self-study, and for use in industrial design,development, and research. A detailed solutions manual is availablefrom the publisher.