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This book is one-stop shop which offers essential information one must know and can implement in real-time business expansions to solve engineering problems in various disciplines. It will also help us to make future predictions and decisions using AI algorithms for engineering problems. Machine learning and optimizing techniques provide strong insights into novice users. In the era of big data, there is a need to deal with data science problems in multidisciplinary perspective. In the real world, data comes from various use cases, and there is a need of source specific data science models. Information is drawn from various platforms, channels, and sectors including web-based media, online business locales, medical services studies, and Internet. To understand the trends in the market, data science can take us through various scenarios. It takes help of artificial intelligence and machine learning techniques to design and optimize the algorithms. Big data modelling and visualization techniques of collected data play a vital role in the field of data science. This book targets the researchers from areas of artificial intelligence, machine learning, data science and big data analytics to look for new techniques in business analytics and applications of artificial intelligence in recent businesses. TRIZ is a brilliant toolkit for nurturing engineering creativity and innovation. This accessible, colourful and practical guide has been developed from problem-solving workshops run by Oxford Creativity, one of the world's top TRIZ training organizations started by Gadd in 1998. Gadd has successfully introduced TRIZ to many major organisations such as Airbus, Sellafield Sites, Saint-Gobain, DCA, Doosan Babcock, Kraft, Qinetiq, Trelleborg, Rolls Royce and BAE Systems, working on diverse major projects including next generation submarines, chocolate packaging, nuclear clean-up, sustainability and cost reduction. Engineering companies are increasingly recognising and acting upon the need to encourage successful, practical and systematic innovation at every stage of the engineering process including product development and design. TRIZ enables greater clarity of thought and taps into the creativity innate in all of us, transforming random, ineffective brainstorming into targeted, audited, creative sessions focussed on the problem at hand and unlocking the engineers' knowledge and genius to identify all the relevant solutions. For good design engineers and technical directors across all industries, as well as students of engineering, entrepreneurship and innovation, TRIZ for Engineers will help unlock and realise the potential of TRIZ. The individual tools are straightforward, the problem-solving process is systematic and repeatable, and the results

will speak for themselves. This highly innovative book: Satisfies the need for concise, clearly presented information together with practical advice on TRIZ and problem solving algorithms Employs explanatory techniques, processes and examples that have been used to train thousands of engineers to use TRIZ successfully Contains real, relevant and recent case studies from major blue chip companies Is illustrated throughout with specially commissioned full-colour cartoons that illustrate the various concepts and techniques and bring the theory to life Turns good engineers into great engineers. Corrosion Engineering: Principles and Solved Problems covers corrosion engineering through an extensive theoretical description of the principles of corrosion theory, passivity and corrosion prevention strategies and design of corrosion protection systems. The book is updated with results published in papers and reviews in the last twenty years. Solved corrosion case studies, corrosion analysis and solved corrosion problems in the book are presented to help the reader to understand the corrosion fundamental principles from thermodynamics and electrochemical kinetics, the mechanism that triggers the corrosion processes at the metal interface and how to control or inhibit the corrosion rates. The book covers the multidisciplinary nature of corrosion engineering through topics from electrochemistry, thermodynamics, mechanical, bioengineering and civil engineering. Addresses the corrosion theory, passivity, material selections and designs Covers extensively the corrosion engineering protection strategies Contains over 500 solved problems, diagrams, case studies and end of chapter problems Could be used as a text in advanced/graduate corrosion courses as well self-study reference for corrosion engineers Successfully prepare for the chemical PE exam with Chemical Engineering Solved Problems. 160 problems, based on 26 different situations, are written in the same multiple-choice format as the exam and offer varying levels of difficulty. This book describes different mathematical modeling and soft computing techniques used to solve practical engineering problems. It gives an overview of the current state of soft computing techniques and describes the advantages and disadvantages of soft computing compared to traditional hard computing techniques. Through examples and case studies, the editors demonstrate and describe how problems with inherent uncertainty can be addressed and eventually solved through the aid of numerical models and methods. The chapters address several applications and examples in bioengineering science, drug delivery, solving inventory issues, Industry 4.0, augmented reality and weather forecasting. Other examples include solving fuzzy-shortest-path problems by introducing a new distance and ranking functions. Because, in practice, problems arise with uncertain data and most of them cannot be solved exactly and easily, the main objective is to develop models that deliver solutions with the aid of numerical methods. This is the reason behind investigating soft numerical computing in dynamic systems. Having this in mind, the authors and editors have considered error of approximation and have discussed several common types of errors and their propagations. Moreover, they have explained the numerical methods, along with convergence and consistence properties and characteristics, as the main objectives behind this book involve considering, discussing and proving related theorems within the setting of soft computing. This book examines dynamic models, and how time is fundamental to the structure of the model and data as well as the understanding of how a process unfolds • Discusses mathematical modeling with soft computing and the implementations of uncertain mathematical models • Examines how uncertain dynamic systems models include uncertain state, uncertain state space and uncertain state's transition functions • Assists readers to become familiar with many soft numerical methods to simulate the solution function's behavior This book is intended for system specialists who are interested in dynamic systems that operate at different time scales. The book can be used by engineering students, researchers and professionals in control and finite element fields as well as all engineering, applied mathematics, economics and computer science interested in dynamic and uncertain systems. Ali Ahmadian is a Senior Lecturer at the Institute of IR 4.0, The National University of Malaysia. Soheil Salahshour is an associate professor at Bahcesehir University. For those taking the structural engineering exam, this book provides comprehensive problem-solving practice. The problems are compiled from a 15-year sample of California's tough structural exams, and solutions are included. The fifth edition of "Engineering Fundamentals & Problem Solving" is written to motivate engineering students during their first year. A complete introduction to the engineering field, this text will help students develop the skills to solving open-ended problems in SI and customary units while presenting solutions in a logical manner. Eide introduces students to subject areas that are common to engineering disciplines that require the application of fundamental engineering concepts. For those instructors who desire a shorter text to complement other application specific texts, McGraw-Hill offers customization through our Primis-Build a Book, or the BEST version of this text. Please see Eide's "Introduction to Engineering Design and Problem Solving," 2nd edition, from the BEST series. Differential Transformation Method for Mechanical Engineering Problems focuses on applying DTM to a range of mechanical engineering applications. The authors modify traditional DTM to produce two additional methods, multi-step differential transformation method (Ms-DTM) and the hybrid differential transformation method and finite difference method (Hybrid DTM-FDM). It is then demonstrated how these can be a suitable series solution for engineering and physical problems, such as the motion of a spherical particle, nanofluid flow and heat transfer, and micropolar fluid flow and heat transfer. Presents the differential transformation method and why it holds an advantage over higher-order Taylor series methods Includes a full mathematical introduction to DTM, Ms-DTM, and Hybrid DTM Covers the use of these methods for solving a range of problems in areas such as nanofluid flow, heat transfer, and motion of a spherical particle in different conditions Provides numerous examples and exercises which will help the reader fully grasp the practical applications of these new methods This book will change the way you think about problems. It focuses on creating solutions to all sorts of complex problems by taking a practical, problem-solving approach. It discusses not only what needs to be done, but it also provides guidance and examples of how to do it. The book applies systems thinking to systems engineering and introduces several innovative concepts such as direct and indirect stakeholders and the Nine-System Model, which provides the context for the activities performed in the project, along with a framework for successful stakeholder management. A list of the figures and tables in this book is available at <https://www.crcpress.com/9781138387935>. FEATURES • Treats systems engineering as a problem-solving methodology • Describes what tools systems engineers use and how they use them in each state of the system lifecycle • Discusses the perennial problem of poor requirements, defines the grammar and structure of a requirement, and provides a template for a good imperative construction statement and the requirements for writing requirements • Provides examples of bad and questionable requirements and explains the reasons why they are bad and questionable • Introduces new concepts such as direct and indirect stakeholders and the Shmemp! • Includes the Nine-System Model and other unique tools for systems engineering Rev. ed. of: 101 solved environmental engineering problems. This book is at once a supplement to traditional foundation engineering textbooks and an independent problem-solving learning tool. The book is written primarily for university students majoring in civil or construction engineering taking foundation analysis and design courses to encourage them to solve design problems. Its main aim is to stimulate problem solving capability and foster self-directed learning. It also explains the use of the foundationPro software, available at no cost, and includes a set of foundation engineering applications. Taking a unique approach, Dr. Yamin summarizes the general step-by-step procedure to solve various foundation engineering problems, illustrates traditional applications of these steps with longhand solutions, and presents the foundation Pro solutions. The special structure of the book allows it to be used in undergraduate and graduate foundation design and analysis courses in civil and construction engineering. The book stands as valuable resource for students, faculty and practicing professional engineers. This book also: Maximizes reader understanding of the basic principles of foundation engineering: shallow foundations on homogeneous soils, single piles, single drilled shafts, and mechanically stabilized earth walls (MSE) Examines bearing capacity and settlement analyses of shallow foundations considering varying elastic moduli of soil and foundation rigidity, piles, and drilled shafts Examines internal and external stabilities of mechanically stabilized earth walls with varying horizontal spacing between reinforcing strips with depth Summarizes the step-by-step procedure needed to solve foundation engineering problems in an easy and systematic way including all necessary equations and charts Civil Engineering Solved Problems includes more than 370 problem scenarios representing a broad range of the NCEES Civil PE exam topics. The problem scenarios are instructionally designed so that you learn how to identify and apply related concepts and equations. The breadth of topics covered and the varied complexities of the problems allow you to assess and strengthen your problem-solving skills. Step-by-step solutions demonstrate accurate, efficient solving methods. Engineering mechanics is one of the fundamental branches of science that is important in the education of professional engineers of any major. Most of the basic engineering courses, such as mechanics of materials, fluid and gas mechanics, machine design, mechatronics, acoustics, vibrations, etc. are based on engineering mechanics courses. In order to absorb the materials of engineering mechanics, it is not enough to consume just theoretical laws and

theorems—a student also must develop an ability to solve practical problems. Therefore, it is necessary to solve many problems independently. This book is a part of a four-book series designed to supplement the engineering mechanics courses. This series instructs and applies the principles required to solve practical engineering problems in the following branches of mechanics: statics, kinematics, dynamics, and advanced kinetics. Each book contains between 6 and 8 topics on its specific branch and each topic features 30 problems to be assigned as homework, tests, and/or midterm/final exams with the consent of the instructor. A solution of one similar sample problem from each topic is provided. This first book contains seven topics of statics, the branch of mechanics concerned with the analysis of forces acting on construction systems without an acceleration (a state of the static equilibrium). The book targets the undergraduate students of the sophomore/junior level majoring in science and engineering. Let's assume that you, the reader, have been educated in the basics of science and perhaps some branch of engineering. You have access to textbooks and handbooks, and you are comfortable with a computer. One day, you find yourself faced with a technical problem. If this problem happens to be essentially identical to a previous problem, which you were trained to solve, clearly you will have no difficulty. Unfortunately, however, the variety of technical problems that you might encounter is enormous. The chance is small that a given problem will be an exact replica of a familiar problem. In such a case, it is possible that you will reach out for the first relevant quantitative relationship that occurs to you. You then might substitute numbers into a formula and obtain an answer, perhaps with the aid of a computer or hand calculator. As the many examples in this book will demonstrate, your answer is quite likely to be wrong because you have overlooked some important aspect of the problem. You can easily convince yourself of this fact by tackling some of the problems in this book.

165 Introductory Problems in the areas of Mechanics, Materials & Structures, Thermodynamics and Mathematics. This text is a clear, concise introduction to problem solving and the C++ programming language. The authors' proven five-step problem solving methodology is presented and then incorporated in every chapter of the text. Outstanding engineering and scientific applications are used throughout; all applications are centered around the theme of engineering challenges in the 21st century. This book teaches readers what chemical engineering is and why it's so important in our daily lives, such as enabling solar panels to promote green energy and the creation of consumer products such as Post-It notes. Readers also learn how chemical engineering has helped in medicine, such as by advancing prosthetics. Planes, trains, and automobiles—these are just some of the many achievements of mechanical engineering. This volume will show readers that they do not have to know complex equations to appreciate the impact the field has had on the world. Accessible text introduces young readers to the machines and engines that power the devices, vehicles, and appliances they encounter on a daily basis. Boxes explain important terms and concepts of mechanics and encourage readers to think critically. The book ends with a guided activity that invites readers to don the hat of a mechanical engineer and build their own windmill. This book, with analytical solutions to 260 select problems, is primarily designed for the second year core course on materials science. The treatment of the book reflects the author's experience of teaching this course comprehensively at IIT-Kanpur for a number of years to the students of engineering and 5-year integrated disciplines. The problems have been categorised into five sections covering a wide range of solid state properties. Section 1 deals with the dual representation of a wave and a particle and then comprehensively explains the behaviour of particles within potential barriers. It provides solutions to the problems that how the energy levels of a free atom lead to the formation of energy bands in solids. The statistics of the distribution of particles in different energy states in a solid has been detailed leading to the derivation of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics and their mutual relationships. Quantitative derivation of the Fermi energy has been obtained by considering free electron energy distribution in solids and then considering Fermi-Dirac distribution as a function of temperature. The derivation of the Richardson's equation and the related work function has been quantitatively dealt with. The phenomenon of tunnelling has been dealt with in terms of quantum mechanics, whereas the band structure and electronic properties of materials are given quantitative treatment by using Fermi-Dirac distribution function. Section 2 deals with the nature of the chemical bonds, types of bonds and their effect on properties, followed by a detailed presentation of crystal structures of some common materials and a discussion on the structures of C60 and carbon nanotubes. Coordination and packing in crystal structures are considered next followed by a detailed X-ray analysis of simple crystal structures, imperfections in crystals, diffusion, phase equilibria, and mechanical behaviour. Section 3 deals with thermal and electrical properties and their mutual relationships. Calculations of Debye frequency, Debye temperature, and Debye specific heat are presented in great detail. A brief section on superconductivity considers both the conventional and the high-TC superconductors. Sections 4 and 5 deal with the magnetic and dielectric materials, considering magnetic properties from the point of view of the band theory of solids. Crystal structures of some common ferrites are given in detail. Similarly, the displacement characteristics in dielectrics are considered from their charge displacements giving rise to some degree of polarization in the materials. Going far beyond "plug-and-chug" solutions, this relatable guide simplifies the scientific principles and breaks down the art of efficient problem-solving. Andrew Sario breaks down years of experience into digestible tips. Boost your career with 10+1 steps to solve real-life engineering problems effectively. Can engineers improve their problem-solving skills? Sario guides readers through ten steps of practical problem-solving with each step including engineering stories from his career as a lead systems engineer in the critical infrastructure and operational technology fields. The 10+1 Steps are an unorthodox way of looking at things but spend its efforts on improving your average time to solve. 1. The Question 2. The Obvious 3. Eyes 4. Check Yourself 5. Doctor G 6. The RTFM Protocol 7. Strip 8. What about the environment? 9. Phone-A-Friend 10. Pray The last step? The Secret step. The steps are designed so that they can work with formal engineering methods giving you ways to improve your approach. 10+1 Steps to problem-solving provides that extra "+1" step for those situations when you have run out of options. The book shows the reader how their problem-solving skills can lead to better pay, more respect and land bigger projects. By following the guiding principles in this book you can confidently help solve problems regardless of current skill and experience. This book provides general guidelines for solving thermal problems in the fields of engineering and natural sciences. Written for a wide audience, from beginner to senior engineers and physicists, it provides a comprehensive framework covering theory and practice and including numerous fundamental and real-world examples. Based on the thermodynamics of various material laws, it focuses on the mathematical structure of the continuum models and their experimental validation. In addition to several examples in renewable energy, it also presents thermal processes in space, and summarizes size-dependent, non-Fourier, and non-Fickian problems, which have increasing practical relevance in, e.g., the semiconductor industry. Lastly, the book discusses the key aspects of numerical methods, particularly highlighting the role of boundary conditions in the modeling process. The book provides readers with a comprehensive toolbox, addressing a wide variety of topics in thermal modeling, from constructing material laws to designing advanced power plants and engineering systems. Of all the PE exams, more people take the civil than any other discipline. The eight-hour, open-book, multiple-choice exam is given every April and October. The exam format is breadth-and-depth -- all examinees are tested on the breadth of civil engineering in the morning session; in the afternoon, they select one of five specialties to be tested on in-depth. Our civil PE books are current with the exam; they reflect the new format, and they reference all the same codes used on the exam. 101 Solved Problems, for extra problem-solving practice. -- Practice problems in essay format cover a wide range of breadth-and-depth exam topics -- Includes full solutions This book brings a fresh new approach to practical problem solving in engineering, covering the critical concepts and ideas that engineers must understand to solve engineering problems. Problem Solving for New Engineers: What Every Engineering Manager Wants You to Know provides strategy and tools needed for new engineers and scientists to become apprentice experimenters armed only with a problem to solve and knowledge of their subject matter. When engineers graduate, they enter the work force with only one part of what's needed to effectively solve problems -- Problem solving requires not just subject matter expertise but an additional knowledge of strategy. With the combination of both knowledge of subject matter and knowledge of strategy, engineering problems can be attacked efficiently. This book develops strategy for minimizing, eliminating, and finally controlling unwanted variation such that all intentional variation is truly representative of the variables of interest. This new guide takes an analytical approach by using step-by-step universal methodologies to solve This easy-to-follow guide is a step by step workbook intended to enhance students' understanding of complicated concepts in food engineering. It also gives them hands-on practice in solving food engineering problems. The book covers problems in fluid flow, heat transfer, and mass transfer. It also tackles the most common unit operations that have applications in food processing, such as thermal processing, cooling and freezing, evaporation, psychometrics and drying. Included are theoretical questions in the form of true or false, solved problems, semi-solved problems, and problems solved using a computer.

The semi-solved problems guide students through the solution. Text for a first course in control systems, revised (1st ed. was 1970) to include new subjects such as the pole placement approach to the design of control systems, design of observers, and computer simulation of control systems. For senior engineering students. Annotation copyright Book News, Inc. This book illuminates what engineering is and how it relates to other disciplines such as art, architecture, law, economics, science, technology, and even religion. The author explains, from an intrinsic as well as descriptive perspective, why engineering is essential for our collective well-being, and how, like medicine, it is undertaken by people, and for people, to improve the human condition. He brings out the 'magic' of engineering practice as well as addressing the darker aspects such as warfare and the misuse of the internet. A too commonly held view assumes that the practice of engineers is a cold, purely quantitative and wholly technical enterprise of applying know science, and devoid of creativity or aestheticism. In 2013 the United States National Academy of Engineering launched a campaign called "Changing the Conversation, Messages for Improving Public Understanding of Engineering" with four messages to impart about engineers: that they make a world of difference; are creative problem solvers; that they help shape the future, and are essential to health, happiness, and safety. In this volume, Professor Blockley incorporate these messages into an engaging exposition of engineering accomplishment in all of its evolving diversity, from the technician to the academic research engineer, illustrating the continuum of thinking and purpose from the fixer of the gas boiler to the designers of the A380 and the iPhone. This book was written with two main objectives in mind - to summarize and organize the vast material of vacuum technology in sets of useful formulas, and to provide a collection of worked out exercises showing how to use these formulas for solving technological problems. It is an ideal reference source for those with little time to devote to a full mathematical treatment of the many problems issued in vacuum practice, but who have a working knowledge of the essentials of vacuum technology, elementary physics, and mathematics. This time saving book employs a problem-solving approach throughout, providing the methodology for computing vacuum parameters. References and solved exercises are appended to the end of each chapter. Presents the thermal transpiration effect in vacuum gauges with application to capacitance manometers in vacuum metrology Covers analytical-statistical calculation of conductances of vacuum elements Examines the molecular flow of gas through short pipes and channels Explains choked and nonchoked laminar flow of gas through vacuum elements Thinking: A Guide to Systems Engineering Problem-Solving focuses upon articulating ways of thinking in today's world of systems and systems engineering. It also explores how the old masters made the advances they made, hundreds of years ago. Taken together, these considerations represent new ways of problem solving and new pathways to answers for modern times. Special areas of interest include types of intelligence, attributes of superior thinkers, systems architecting, corporate standouts, barriers to thinking, and innovative companies and universities. This book provides an overview of more than a dozen ways of thinking, to include: Inductive Thinking, Deductive Thinking, Reductionist Thinking, Out-of-the-Box Thinking, Systems Thinking, Design Thinking, Disruptive Thinking, Lateral Thinking, Critical Thinking, Fast and Slow Thinking, and Breakthrough Thinking. With these thinking skills, the reader is better able to tackle and solve new and varied types of problems. Features Proposes new approaches to problem solving for the systems engineer Compares as well as contrasts various types of Systems Thinking Articulates thinking attributes of the great masters as well as selected modern systems engineers Offers chapter by chapter thinking exercises for consideration and testing Suggests a "top dozen" for today's systems engineers This book provides readers with modern computational techniques for solving variety of problems from electrical, mechanical, civil and chemical engineering. Mathematical methods are presented in a unified manner, so they can be applied consistently to problems in applied electromagnetics, strength of materials, fluid mechanics, heat and mass transfer, environmental engineering, biomedical engineering, signal processing, automatic control and more. Introduction to Engineering Programming: Solving Problems with Algorithms provides students of engineering with the tools to think algorithmically about scientific and mathematical problems within the first and second year engineering curriculum. The text supports the teaching of basic numerical and image processing algorithms as examples of engineering design. The creative aspects of solving unfamiliar problems by using available tools -- the heart of engineering education and practice--are emphasized. A concern for elegance and correctness is a core value that the text seeks to convey to students. The text uses C++ to implement algorithms, and is presented clearly and precisely. The text emphasizes a subset of C++ that can be used to solve many problems from physics, calculus, biology and introductory engineering courses, and it de-emphasizes many features of the language that are unnecessary or ill-designed for this purpose, or too advanced to be comfortably covered in a first year college engineering course. Suitable for 2nd-year college and university engineering students, this book provides them with a source of problems with solutions in vector mechanics that covers various aspects of the basic course. It offers the comprehensive solved-problem reference in the subject. It also provides the student with the problem solving drill. Structural Engineering Solved Problems contains 100 practice problems representing a broad range of topics on the Structural Engineering (SE) and Civil PE exams. Each problem provides an opportunity to apply your knowledge of structural engineering concepts. The breadth of topics covered and the varied complexities of the problems allow you to assess and strengthen your problem-solving skills. Problems in both qualitative and quantitative formats are included, and solutions use the same codes and standards adopted for the exam. Step-by-step solutions are used to solve numerical problems, and detailed explanations are given for qualitative problems. Structural Engineering Solved Problems will help you to familiarize yourself with the exam topics connect relevant structural engineering theories to challenging problems navigate through exam-adopted codes and standards identify accurate and efficient problem-solving approaches Topics Covered Foundations and Retaining Structures Masonry Design Seismic Design Structural Analysis Structural Concrete Design Structural Steel Design Timber Design Codes and Standards Used in This Book AASHTO LRFD Bridge Design Specifications (AASHTO) Building Code Requirements and Specification for Masonry Structures (ACI 530/530.1) Building Code Requirements for Structural Concrete (ACI 318) International Building Code (IBC) Minimum Design Loads for Buildings and Other Structures (ASCE/SEI7) National Design Specification for Wood Construction ASD/LRFD (NDS) PCI Design Handbook: Precast and Prestressed Concrete (PCI) Seismic Design Manual (AISC 325) Special Design Provisions for Wind and Seismic with Commentary (SDPWS) Steel Construction Manual (AISC 327) North American Specification for the Design of Cold-Formed Steel Structural Members (AISI) Nothing builds your confidence for an exam like solving problems. 246 Solved Structural Engineering Problems will help you prepare for the NCEES Structural I and II exams, the California state structural exam, and the structural module of the civil PE exam. In each chapter, problems are arranged in order of increasing complexity, offering practice levels appropriate for each of these tests. Exam topics covered are Structural Analysis Structural Concrete Structural Steel Timber Seismic Analysis Foundation Design Masonry In the structural steel chapter, problems may be solved with either the AISC ASD or LRFD method, whichever you're comfortable with. (The NCEES exams permit either method; the California exam requires use of both methods.) Solutions show all essential steps. "A companion book including interactive software for students and professional engineers who want to utilize problem-solving software to effectively and efficiently obtain solutions to realistic and complex problems. An Invaluable reference book that discusses and Illustrates practical numerical problem solving in the core subject areas of Chemical Engineering. Problem Solving in Chemical Engineering with Numerical Methods provides an extensive selection of problems that require numerical solutions from throughout the core subject areas of chemical engineering. Many are completely solved or partially solved using POLYMATH as the representative mathematical problem-solving software, Ten representative problems are also solved by Excel, Maple, Mathcad, MATLAB, and Mathematica. All problems are clearly organized and all necessary data are provided. Key equations are presented or derived. Practical aspects of efficient and effective numerical problem solving are emphasized. Many complete solutions are provided within the text and on the CD-ROM for use in problem-solving exercises."--BOOK JACKET.Title Summary field provided by Blackwell North America, Inc. All Rights Reserved Avoid wasting time and money on recurring plant process problems by applying the practical, five-step solution in Process Engineering Problem Solving: Avoiding "The Problem Went Away, but it Came Back" Syndrome. Combine cause and effect problem solving with the formulation of theoretically correct working hypotheses and find a structural and pragmatic way to solve real-world issues that tend to be chronic or that require an engineering analysis. Utilize the fundamentals of chemical engineering to develop technically correct working hypotheses that are key to successful problem solving. Computational complexity is a serious bottleneck for the design process in virtually any engineering area. While migration from prototyping and experimental-based design validation to verification using computer simulation models is inevitable and has a number of advantages, high computational costs of accurate, high-fidelity simulations can be a major issue that slows down the development of computer-aided design

methodologies, particularly those exploiting automated design improvement procedures, e.g., numerical optimization. The continuous increase of available computational resources does not always translate into shortening of the design cycle because of the growing demand for higher accuracy and necessity to simulate larger and more complex systems. Accurate simulation of a single design of a given system may be as long as several hours, days or even weeks, which often makes design automation using conventional methods impractical or even prohibitive. Additional problems include numerical noise often present in the simulation data, possible presence of multiple locally optimum designs, as well as multiple conflicting objectives. In this edited book, various techniques that can alleviate solving computationally expensive engineering design problems are presented. One of the most promising approaches is the use of fast replacement models, so-called surrogates, that reliably represent the expensive, simulation-based model of the system/device of interest but they are much cheaper and analytically tractable. Here, a group of international experts summarize recent developments in the area and demonstrate applications in various disciplines of engineering and science. The main purpose of the work is to provide the basic concepts and formulations of the surrogate-based modeling and optimization paradigm, as well as discuss relevant modeling techniques, optimization algorithms and design procedures. Therefore, this book should be useful to researchers and engineers from any discipline where computationally heavy simulations are used on daily basis in the design process. Most people try to avoid problems - but not engineers! They go out and look for problems! In this fun, new title readers will learn about the kinds of problems engineers help solve. Readers are also introduced to the tool engineers use to solve problems: The Engineering Design Process. Teacher's guide available. Engineering, at its origins, was a profession of problem solving. The classic text, Dialogues Concerning Two New Sciences by Galileo Galilei is revisited in this ambitious and comprehensive book by Milton Shaw. In-depth discussions of passages from the Galileo text emphasize the "mind set" of engineering, specifically the roles played by experimentation and dialog in analysis and creativity. In the epilogue, the author points out that engineering students are usually exposed to two types of faculty. The first type is mathematically oriented and mostly interested in analytical solutions. The second type is interested in devising and experimenting with innovative solutions. However, since many talented graduates move directly into teaching instead of gaining real world experience, an imbalance of analytical teaching has occurred. Shaw points out through an example by Dr. Dave Lineback that learning to solve practical engineering problems is a very important part of an engineer's education, but is often denied due to expense and time and effort required. This book fills in many of the gaps in engineering education by showing students, and professionals, the historical background of problem solving. Among those who will find this book particularly useful are engineers working in cross-disciplinary capacities, such as mechanical engineers working with electrical engineering concepts or polymeric materials, engineers preparing for professional engineering exams, mid-career engineers looking to broaden their problem-solving skills, and students looking for help growing their skills.

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