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provides a detailed and systematic description of the method of moments boundary element method for electromagnetic modeling at low frequencies and includes hands on application based matlab modules with user friendly and intuitive gui and a highly visualized interactive output includes a full body computational human phantom with over 120 triangular surface meshes extracted from the visible human project female dataset of the national library of medicine and fully compatible with matlab and major commercial fem bem electromagnetic software simulators this book covers the basic concepts of computational low frequency electromagnetics in an application based format and hones the knowledge of these concepts with hands on matlab modules the book is divided into five parts part 1 discusses low frequency electromagnetics basic theory of triangular surface mesh generation and computational human phantoms part 2 covers electrostatics of conductors and dielectrics and direct current flow linear magnetostatics is analyzed in part 3 part 4 examines theory and applications of eddy currents finally part 5 evaluates nonlinear electrostatics application examples included in this book cover all major subjects of low frequency electromagnetic theory in addition this book includes complete or summarized analytical solutions to a large number of quasi static electromagnetic problems each chapter concludes with a summary of the corresponding matlab modules combines fundamental electromagnetic theory and application oriented computation algorithms in the form of stand alone matlab modules makes use of the three dimensional method of moments mom for static and quasistatic electromagnetic problems contains a detailed full body computational human phantom from the visible human project female embedded implant models and a collection of homogeneous human shells low frequency electromagnetic modeling for electrical and biological systems using matlab is a resource for electrical and biomedical engineering students and practicing researchers engineers and medical doctors working on low frequency modeling and bioelectromagnetic applications readers are guided step by step through numerous specific problems and challenges covering all aspects of electrostatics with an emphasis on numerical procedures the author focuses on practical examples derives mathematical equations and addresses common issues with algorithms introduction to numerical electrostatics contains problem sets an accompanying web site with simulations and a complete list of computer codes computer source code listings on accompanying web site problem sets included with book readers using matlab or other simulation packages will gain insight as to the inner workings of these packages and how to account for their limitations example computer code is provided in matlab solutions manual the first book of its kind uniquely devoted to the field of computational electrostatics employ essential and hands on tools and functions of the matlab and simulink packages which are explained and demonstrated via interactive examples and case studies this book contains dozens of simulation models and solved problems via m files scripts and simulink models which help you to learn programming and modeling essentials you ll become efficient with many of the built in tools and functions of matlab simulink while solving engineering and scientific computing problems beginning matlab and simulink explains various practical issues of programming and modelling in parallel by comparing matlab and simulink after reading and using this book you ll be proficient at using matlab and applying the source code from the book s examples as templates for your own projects in data science or engineering what you will learn get started using matlab and simulink carry out data visualization with matlab gain the programming and modeling essentials of matlab build a gui with matlab work with integration and numerical root finding methods apply matlab to differential equations based models and simulations use matlab for data science projects who this book is for engineers programmers data scientists and students majoring in engineering and scientific computing matlab simulink essentials is an interactive approach based guide for students to learn how to employ essential and hands on tools and functions of the matlab and simulink packages to solve engineering and scientific computing problems which are explained and demonstrated explicitly via examples exercises and case studies the main principle of the book is based on learning by doing and mastering by practicing it contains hundreds of solved problems with simulation models via m files scripts and simulink models related to engineering and scientific computing issues there are many hints and pitfalls indicating efficient usage of matlab simulink tools and functions efficient programming methods and pinpointing most common errors occurred in programming and using matlab s built in tools and functions and simulink modeling every chapter ends with relevant drill exercises for self testing purposes the use of matlab in clinical medical physics is continuously increasing thanks to new technologies and developments in the field however there is a lack of practical guidance for students researchers and medical professionals on how to incorporate it into their work focusing on the areas of diagnostic nuclear medicine and radiation oncology imaging this book provides a comprehensive treatment of the use of matlab in clinical medical physics in nuclear medicine it is an invaluable guide for medical physicists and researchers in addition to postgraduates in

medical physics or biomedical engineering preparing for a career in the field in the field of nuclear medicine matlab enables quantitative analysis and the visualization of nuclear medical images of several modalities such as single photon emission computed tomography spect positron emission tomography pet or a hybrid system where a computed tomography system is incorporated into a spect or pet system or similarly a magnetic resonance imaging system mri into a spect or pet system through a high performance interactive software matlab also allows matrix computation simulation quantitative analysis image processing and algorithm implementation matlab can provide medical physicists with the necessary tools for analyzing and visualizing medical images it is useful in creating imaging algorithms for diagnostic and therapeutic purposes solving problems of image reconstruction processing and calculating absorbed doses with accuracy an important feature of this application of matlab is that the results are completely reliable and are not dependent on any specific γ cameras and workstations the use of matlab algorithms can greatly assist in the exploration of the anatomy and functions of the human body offering accurate and precise results in nuclear medicine studies key features presents a practical case based approach whilst remaining accessible to students contains chapter contributions from subject area specialists across the field includes real clinical problems and examples with worked through solutions maria lyra georgosopoulou phd is a medical physicist and associate professor at the national and kapodistrian university of athens greece photo credit the antikythera mechanism is the world s oldest known analog computer it consisted of many wheels and discs that could be placed onto the mechanism for calculations it is possible that the first algorithms and analog calculations in mathematics were implemented with this mechanism invented in the early first centuries bc it has been selected for the cover to demonstrate the importance of calculations in science advanced mathematics the 40th volume of methods in microbiology focuses on microbial synthetic biology synthetic biology is a rapidly growing discipline that builds on well established principles of genetic engineering and biotechnology by integrating computational and engineering approaches to the design and construction of novel biological systems this volume addresses some of the major technical challenges stand in the way of achieving a radical step change in our ability to engineer complex multi scaled biological systems these include the application of computation intelligence to the design of synthetic microbial systems design automation and constraints the impact of noise and stochasticity the engineering of biosensors the characteristic of a model bacterial chassis a key issue in synthetic biology is that of its social dimensions and a chapter is dedicated to the important issue authority or expertise of contributors links to websites for the design and modelling of microbes and microbial metabolism first volume to address the practical issues discussion on responsible innovation integrates comprehensive studies and designs of electromechanical systems and motion devices as well as demonstrates the application of theoretical results in the analysis and design of electromechanical systems this book covers topics such as electromechanical motion devices and power electronics and sensors vols 1 2 4 contain the proceedings of the society s 3rd 1956 5th 1958 annual meeting v 3 contains the proceedings of the western regional meeting of the aas aug 1958

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readers are guided step by step through numerous specific problems and challenges covering all aspects of electrostatics with an emphasis on numerical procedures the author focuses on practical examples derives mathematical equations and addresses common issues with algorithms introduction to numerical electrostatics contains problem sets an accompanying web site with simulations and a complete list of computer codes computer source code listings on accompanying web site problem sets included with book readers using matlab or other simulation packages will gain insight as to the inner workings of these packages and how to account for their limitations example computer code is provided in matlab solutions manual the first book of its kind uniquely devoted to the field of computational electrostatics

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matlab simulink essentials is an interactive approach based guide for students to learn how to employ essential and hands on tools and functions of the matlab and simulink packages to solve engineering and scientific computing problems which are explained and demonstrated explicitly via examples exercises and case studies the main principle of the book is based on learning by doing and mastering by practicing it contains hundreds of solved problems with simulation models via m files scripts and simulink models related to engineering and scientific computing issues there are many hints and pitfalls indicating efficient usage of matlab simulink tools and functions efficient programming methods and pinpointing most common errors occurred in programming and using matlab s built in tools and functions and simulink modeling every chapter ends with relevant drill exercises for self testing purposes

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the 40th volume of methods in microbiology focuses on microbial synthetic biology synthetic biology is a rapidly growing discipline that builds on well established principles of genetic engineering and biotechnology by integrating computational and engineering approaches to the design and construction of novel biological systems this volume addresses some of the major technical challenges stand in the way of achieving a radical step change in our ability to engineer complex multi scaled biological systems these include the application of computation intelligence to the design of synthetic microbial systems

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