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Specific Heat of Fuel--Air Mixtures; 3.3 Liquid-Vapor-Gas Mixtures; 3.4 Stoichiometry; 3.5 Low-Temperature Combustion Modeling; Fuel-Air-Residual Gas; 3.6 General Chemical Equilibrium; 3.7 Chemical Equilibrium using Equilibrium Constants; 3.8 References; 3.9 Homework; Chapter 4:Fuel-Air Combustion Processes; 4.1 Introduction; 4.2 Combustion and the First Law; Heat of Combustion; Adiabatic Flame Temperature
Isentropic Processes4.3 Maximum Work and the Second Law; Exergy Change for an Isentropic Compression or Expansion; Available Energy of Combustion; 4.4 Fuel-Air Otto Cycle; 4.5 Four-Stroke Fuel-Air Otto Cycle; 4.6 Homogeneous Two-Zone Finite Heat Release Cycle; 4.7 Comparison of Fuel-Air Cycles with Actual Spark Ignition Cycles; 4.8 Limited Pressure Fuel-Air Cycle; 4.9 Comparison of Limited Pressure Fuel-Air Cycles with Actual Compression Ignition Cycles; 4.10 References; 4.11 Homework; Chapter 5:Intake and Exhaust Flow; 5.1 Introduction; 5.2 Valve Flow; Valve Flow and Discharge Coefficients Exhaust Gas BlowdownValve Mach Index; Valve Timing; Effect of Valve Timing on Volumetric Efficiency and Residual Fraction; 5.3 Intake and Exhaust Flow; 5.4 Superchargers and Turbochargers; 5.5 Effect of Ambient Conditions on Engine and Compressor Mass Flow; 5.6 References; 5.7 Homework; Chapter 6:Fuel and Airflow in the Cylinder; 6.1 Introduction; 6.2 Carburetion; 6.3 Fuel Injection-Spark Ignition; Fuel Injection Systems; 6.4 Fuel Injection-Compression Ignition; Diesel Injection Systems; Diesel Sprays; 6.5 Large-Scale in-Cylinder Flow; Introduction; Cylinder Flow Measurement Techniques Computational Simulation of In-Cylinder Flow Fields

Sommario/riassunto

"Since the publication of the Second Edition in 2001, there have been considerable advances and developments in the field of internal combustion engines. These include the increased importance of biofuels, new internal combustion processes, more stringent emissions requirements and characterization, and more detailed engine performance modeling, instrumentation, and control. There have also been changes in the instructional methodologies used in the applied thermal sciences that require inclusion in a new edition. These methodologies suggest that an increased focus on applications, examples, problem-based learning, and computation will have a positive effect on learning of the material, both at the novice student, and practicing engineer level. This Third Edition mirrors its predecessor with additional tables, illustrations, photographs, examples, and problems/solutions. All of the software is 'open source', so that readers can see how the computations are performed. In addition to additional java applets, there is companion Matlab code, which has become a default computational tool in most mechanical engineering programs"--

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2.11 Infinite Rod2.12 The Error Function; 2.13 Comments and References; Chapter Review; Miscellaneous Exercises; Chapter 3. The Wave Equation; 3.1 The Vibrating String; 3.2 Solution of the Vibrating String Problem; 3.3 d'Alembert's Solution; 3.4 One-Dimensional Wave Equation: Generalities; 3.5 Estimation of Eigenvalues; 3.6 Wave Equation in Unbounded Regions; 3.7 Comments and References; Chapter Review; Miscellaneous Exercises; Chapter 4. The Potential Equation; 4.1 Potential Equation; 4.2 Potential in a Rectangle; 4.3 Further Examples for a Rectangle; 4.4 Potential in Unbounded Regions 4.5 Potential in a Disk4.6 Classification and Limitations; 4.7 Comments and References; Chapter Review; Miscellaneous Exercises; Chapter 5. Higher Dimensions and Other Coordinates; 5.1 Two-Dimensional Wave Equation: Derivation; 5.2 Three-Dimensional Heat Equation; 5.3 Two-Dimensional Heat Equation: Solution; 5.4 Problems in Polar Coordinates; 5.5 Bessel's Equation; 5.6 Temperature in a Cylinder; 5.7 Vibrations of a Circular Membrane; 5.8 Some Applications of Bessel Functions; 5.9 Spherical Coordinates; Legendre Polynomials; 5.10 Some Applications of Legendre Polynomials
5.11 Comments and ReferencesChapter Review; Miscellaneous Exercises; Chapter 6. Laplace Transform; 6.1 Definition and Elementary Properties; 6.2 Partial Fractions and Convolutions; 6.3 Partial Differential Equations; 6.4 More Difficult Examples; 6.5 Comments and References; Miscellaneous Exercises; Chapter 7. Numerical Methods; 7.1 Boundary Value Problems; 7.2 Heat Problems; 7.3 Wave Equation; 7.4 Potential Equation; 7.5 Two-Dimensional Problems; 7.6 Comments and References; Miscellaneous Exercises; Bibliography; Mathematical References; Answers to Odd-Numbered Exercises; Chapter 0; Chapter 1 Chapter 2

Sommario/riassunto

Boundary Value Problems is the leading text on boundary value problems and Fourier series. The author, David Powers, (Clarkson) has written a thorough, theoretical overview of solving boundary value problems involving partial differential equations by the methods of separation of variables. Professors and students agree that the author is a master at creating linear problems that adroitly illustrate the techniques of separation of variables used to solve science and engineering.* CD with animations and graphics of solutions, additional exercises and chapter review questions