

国外电子与通信教材系列

英文版

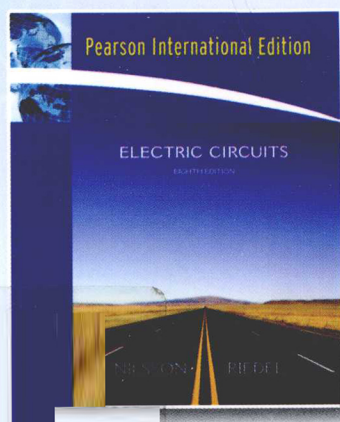
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电路

(第八版)

Electric Circuits Eighth Edition

[美] James W. Nilsson 著
Susan A. Riedel



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内 容 简 介

本书被 IEEE Spectrum 杂志称为“电路领域的经典之作”，是欧美“电路”课程采用最为广泛的教材。全书共分 18 章，系统地讲述了电路的基本概念、基本理论、基本分析和计算方法。主要内容有电路基本元件、简单电阻电路分析、电路常见分析法、运算放大器基本应用电路、一阶和二阶动态电路的分析、正弦稳态分析及其功率计算、平衡三相电路、拉普拉斯变换及其应用、选频电路、有源滤波器、傅里叶级数及傅里叶变换、双端口网络等。书中结合生活中的实际应用展开，给出了大量的例题、习题和详尽的图表资料，内容新颖，讲解透彻，是一本电路分析的优秀教材。

本书是电气、电子、计算机与自动化等本科专业电路课程的双语教材，也可供相关学科的科技人员自学或参考。

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序

2001年7月间,电子工业出版社的领导同志邀请各高校十几位通信领域方面的老师,商量引进国外教材问题。与会同志对出版社提出的计划十分赞同,大家认为,这对我国通信事业、特别是对高等院校通信学科的教学工作会很有好处。

教材建设是高校教学建设的主要内容之一。编写、出版一本好的教材,意味着开设了一门好的课程,甚至可能预示着一个崭新学科的诞生。20世纪40年代MIT林肯实验室出版的一套28本雷达丛书,对近代电子学科、特别是对雷达技术的推动作用,就是一个很好的例子。

我国领导部门对教材建设一直非常重视。20世纪80年代,在原教委教材编审委员会的领导下,汇集了高等院校几百位富有教学经验的专家,编写、出版了一大批教材;很多院校还根据学校的特点和需要,陆续编写了大量的讲义和参考书。这些教材对高校的教学工作发挥了极好的作用。近年来,随着教学改革不断深入和科学技术的飞速进步,有的教材内容已比较陈旧、落后,难以适应教学的要求,特别是在电子学和通信技术发展神速、可以讲是日新月异的今天,如何适应这种情况,更是一个必须认真考虑的问题。解决这个问题,除了依靠高校的老师 and 专家撰写新的符合要求的教科书外,引进和出版一些国外优秀电子与通信教材,尤其是有选择地引进一批英文原版教材,是会有好处的。

一年多来,电子工业出版社为此做了很多工作。他们成立了一个“国外电子与通信教材系列”项目组,选派了富有经验的业务骨干负责有关工作,收集了230余种通信教材和参考书的详细资料,调来了100余种原版教材样书,依靠由20余位专家组成的出版委员会,从中精选了40多种,内容丰富,覆盖了电路理论与应用、信号与系统、数字信号处理、微电子、通信系统、电磁场与微波等方面,既可作为通信专业本科生和研究生的教学用书,也可作为有关专业人员的参考材料。此外,这批教材,有的翻译为中文,还有部分教材直接影印出版,以供教师用英语直接授课。希望这些教材的引进和出版对高校通信教学和教材改革能起一定作用。

在这里,我还要感谢参加工作的各位教授、专家、老师与参加翻译、编辑和出版的同志们。各位专家认真负责、严谨细致、不辞辛劳、不怕琐碎和精益求精的态度,充分体现了中国教育工作者和出版工作者的良好美德。

随着我国经济建设的发展和科学技术的不断进步,对高校教学工作会不断提出新的要求和希望。我想,无论如何,要做好引进国外教材的工作,一定要联系我国的实际。教材和学术专著不同,既要注意科学性、学术性,也要重视可读性,要深入浅出,便于读者自学;引进的教材要适应高校教学改革的需要,针对目前一些教材内容较为陈旧的问题,有目的地引进一些先进的和正在发展中的交叉学科的参考书;要与国内出版的教材相配套,安排好出版英文原版教材和翻译教材的比例。我们努力使这套教材能尽量满足上述要求,希望它们能放在学生们的课桌上,发挥一定的作用。

最后,预祝“国外电子与通信教材系列”项目取得成功,为我国电子与通信教学和通信产业的发展培土施肥。也恳切希望读者能对这些书籍的不足之处、特别是翻译中存在的问题,提出意见和建议,以便再版时更正。



中国工程院院士、清华大学教授
“国外电子与通信教材系列”出版委员会主任

出版说明

进入21世纪以来,我国信息产业在生产和科研方面都大大加快了发展速度,并已成为国民经济发展的支柱产业之一。但是,与世界上其他信息产业发达的国家相比,我国在技术开发、教育培训等方面都还存在着较大的差距。特别是在加入WTO后的今天,我国信息产业面临着国外竞争对手的严峻挑战。

作为我国信息产业的专业科技出版社,我们始终关注着全球电子信息技术的发展方向,始终把引进国外优秀电子与通信信息技术教材和专业书籍放在我们工作的重要位置上。在2000年至2001年间,我社先后从世界著名出版公司引进出版了40余种教材,形成了一套“国外计算机科学教材系列”,在全国高校以及科研部门中受到了欢迎和好评,得到了计算机领域的广大教师与科研工作者的充分肯定。

引进和出版一些国外优秀电子与通信教材,尤其是有选择地引进一批英文原版教材,将有助于我国信息产业培养具有国际竞争能力的技术人才,也将有助于我国国内在电子与通信教学工作中掌握和跟踪国际发展水平。根据国内信息产业的现状、教育部《关于“十五”期间普通高等教育教材建设与改革的意见》的指示精神以及高等院校老师们反映的各种意见,我们决定引进“国外电子与通信教材系列”,并随后开展了大量准备工作。此次引进的国外电子与通信教材均来自国际著名出版商,其中影印教材约占一半。教材内容涉及的学科方向包括电路理论与应用、信号与系统、数字信号处理、微电子、通信系统、电磁场与微波等,其中既有本科专业课程教材,也有研究生课程教材,以适应不同院系、不同专业、不同层次的师生对教材的需求,广大师生可自由选择 and 自由组合使用。我们还将与国外出版商一起,陆续推出一些教材的教学支持资料,为授课教师提供帮助。

此外,“国外电子与通信教材系列”的引进和出版工作得到了教育部高等教育司的大力支持和帮助,其中的部分引进教材已通过“教育部高等学校电子信息科学与工程类专业教学指导委员会”的审核,并得到教育部高等教育司的批准,纳入了“教育部高等教育司推荐——国外优秀信息科学与技术系列教学用书”。

为做好该系列教材的翻译工作,我们聘请了清华大学、北京大学、北京邮电大学、南京邮电大学、东南大学、西安交通大学、天津大学、西安电子科技大学、电子科技大学、中山大学、哈尔滨工业大学、西南交通大学等著名高校的教授和骨干教师参与教材的翻译和审校工作。许多教授在国内电子与通信专业领域享有较高的声望,具有丰富的教学经验,他们的渊博学识从根本上保证了教材的翻译质量和专业学术方面的严格与准确。我们在此对他们的辛勤工作与贡献表示衷心的感谢。此外,对于编辑的选择,我们达到了专业对口;对于从英文原书中发现的错误,我们通过与作者联络、从网上下载勘误表等方式,逐一进行了修订;同时,我们对审校、排版、印制质量进行了严格把关。

今后,我们将进一步加强同各高校教师的密切关系,努力引进更多的国外优秀教材和教学参考书,为我国电子与通信教材达到世界先进水平而努力。由于我们对国内外电子与通信教育的发展仍存在一些认识上的不足,在选题、翻译、出版等方面的工作中还有许多需要改进的地方,恳请广大师生和读者提出批评及建议。

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Contents

List of Examples 11

Preface 15

Chapter 1 Circuit Variables 22

1.1 Electrical Engineering: An Overview 23

1.2 The International System of Units 28

1.3 Circuit Analysis: An Overview 30

1.4 Voltage and Current 31

1.5 The Ideal Basic Circuit Element 32

1.6 Power and Energy 34

Summary 36

Problems 37

Chapter 2 Circuit Elements 42

Practical Perspective: Electrical Safety 43

2.1 Voltage and Current Sources 44

2.2 Electrical Resistance (Ohm's Law) 48

2.3 Construction of a Circuit Model 52

2.4 Kirchhoff's Laws 56

2.5 Analysis of a Circuit Containing Dependent Sources 62

Practical Perspective: Electrical Safety 66

Summary 67

Problems 68

Chapter 3 Simple Resistive Circuits 76

Practical Perspective: A Rear Window Defroster 77

3.1 Resistors in Series 78

3.2 Resistors in Parallel 79

3.3 The Voltage-Divider and Current-Divider Circuits 82

3.4 Voltage Division and Current Division 85

3.5 Measuring Voltage and Current 88

3.6 Measuring Resistance—The Wheatstone Bridge 91

3.7 Delta-to-Wye (Pi-to-Tee) Equivalent Circuits 93

Practical Perspective: A Rear Window Defroster 96

Summary 99

Problems 100

Chapter 4 Techniques of Circuit Analysis 112

Practical Perspective: Circuits with Realistic Resistors 113

4.1 Terminology 114

4.2 Introduction to the Node-Voltage Method 117

4.3 The Node-Voltage Method and Dependent Sources 120

4.4 The Node-Voltage Method: Some Special Cases 121

4.5 Introduction to the Mesh-Current Method 125

4.6 The Mesh-Current Method and Dependent Sources 127

4.7 The Mesh-Current Method: Some Special Cases 129

4.8 The Node-Voltage Method Versus the Mesh-Current Method 132

4.9 Source Transformations 136

4.10 Thévenin and Norton Equivalents 139

4.11 More on Deriving a Thévenin Equivalent 143

4.12 Maximum Power Transfer 146

4.13 Superposition 149

Practical Perspective: Circuits with Realistic Resistors 153

Summary 157

Problems 158

Chapter 5 The Operational Amplifier 174

Practical Perspective: Strain Gages 175

5.1 Operational Amplifier Terminals 176

5.2 Terminal Voltages and Currents 176

5.3 The Inverting-Amplifier Circuit 181

5.4 The Summing-Amplifier Circuit 183

5.5 The Noninverting-Amplifier Circuit 184

5.6 The Difference-Amplifier Circuit 185

5.7 A More Realistic Model for the Operational Amplifier 190

Practical Perspective: Strain Gages 193

Summary 195

Problems 196

Chapter 6 Inductance, Capacitance, and Mutual Inductance 206

Practical Perspective: Proximity Switches 207

- 6.1 The Inductor 208
- 6.2 The Capacitor 215
- 6.3 Series-Parallel Combinations of Inductance and Capacitance 220
- 6.4 Mutual Inductance 223
- 6.5 A Closer Look at Mutual Inductance 227
- Practical Perspective: Proximity Switches* 234
- Summary* 237
- Problems* 238

Chapter 7 Response of First-Order RL and RC Circuits 248

Practical Perspective: A Flashing Light Circuit 249

- 7.1 The Natural Response of an RL Circuit 250
- 7.2 The Natural Response of an RC Circuit 256
- 7.3 The Step Response of RL and RC Circuits 260
- 7.4 A General Solution for Step and Natural Responses 268
- 7.5 Sequential Switching 274
- 7.6 Unbounded Response 278
- 7.7 The Integrating Amplifier 280
- Practical Perspective: A Flashing Light Circuit* 283
- Summary* 285
- Problems* 285

Chapter 8 Natural and Step Responses of RLC Circuits 304

Practical Perspective: An Ignition Circuit 305

- 8.1 Introduction to the Natural Response of a Parallel RLC Circuit 306
- 8.2 The Forms of the Natural Response of a Parallel RLC Circuit 311
- 8.3 The Step Response of a Parallel RLC Circuit 321
- 8.4 The Natural and Step Response of a Series RLC Circuit 328
- 8.5 A Circuit with Two Integrating Amplifiers 332
- Practical Perspective: An Ignition Circuit* 337
- Summary* 340
- Problems* 341

Chapter 9 Sinusoidal Steady-State Analysis 350

Practical Perspective: A Household Distribution Circuit 351

- 9.1 The Sinusoidal Source 352
- 9.2 The Sinusoidal Response 355
- 9.3 The Phasor 357
- 9.4 The Passive Circuit Elements in the Frequency Domain 362
- 9.5 Kirchhoff's Laws in the Frequency Domain 366
- 9.6 Series, Parallel, and Delta-to-Wye Simplifications 368
- 9.7 Source Transformations and Thévenin-Norton Equivalent Circuits 375
- 9.8 The Node-Voltage Method 379
- 9.9 The Mesh-Current Method 380
- 9.10 The Transformer 381
- 9.11 The Ideal Transformer 385
- 9.12 Phasor Diagrams 392
- Practical Perspective: A Household Distribution Circuit* 395
- Summary* 395
- Problems* 396

Chapter 10 Sinusoidal Steady-State Power Calculations 410

Practical Perspective: Heating Appliances 411

- 10.1 Instantaneous Power 412
- 10.2 Average and Reactive Power 414
- 10.3 The rms Value and Power Calculations 419
- 10.4 Complex Power 421
- 10.5 Power Calculations 423
- 10.6 Maximum Power Transfer 430
- Practical Perspective: Heating Appliances* 437
- Summary* 439
- Problems* 440

Chapter 11 Balanced Three-Phase Circuits 452

Practical Perspective: Transmission and Distribution of Electric Power 453

- 11.1 Balanced Three-Phase Voltages 454
- 11.2 Three-Phase Voltage Sources 455
- 11.3 Analysis of the Wye-Wye Circuit 456
- 11.4 Analysis of the Wye-Delta Circuit 462
- 11.5 Power Calculations in Balanced Three-Phase Circuits 465

11.6 Measuring Average Power in Three-Phase Circuits 472

Practical Perspective: Transmission and Distribution of Electric Power 475

Summary 476

Problems 477

Chapter 12 Introduction to the Laplace Transform 486

12.1 Definition of the Laplace Transform 487

12.2 The Step Function 488

12.3 The Impulse Function 490

12.4 Functional Transforms 494

12.5 Operational Transforms 495

12.6 Applying the Laplace Transform 501

12.7 Inverse Transforms 502

12.8 Poles and Zeros of $F(s)$ 514

12.9 Initial- and Final-Value Theorems 515

Summary 518

Problems 519

Chapter 13 The Laplace Transform in Circuit Analysis 526

Practical Perspective: Surge Suppressors 527

13.1 Circuit Elements in the s Domain 528

13.2 Circuit Analysis in the s Domain 531

13.3 Applications 532

13.4 The Transfer Function 546

13.5 The Transfer Function in Partial Fraction Expansions 548

13.6 The Transfer Function and the Convolution Integral 551

13.7 The Transfer Function and the Steady-State Sinusoidal Response 557

13.8 The Impulse Function in Circuit Analysis 560

Practical Perspective: Surge Suppressors 568

Summary 569

Problems 570

Chapter 14 Introduction to Frequency Selective Circuits 586

Practical Perspective: Pushbutton Telephone Circuits 587

14.1 Some Preliminaries 588

14.2 Low-Pass Filters 590

14.3 High-Pass Filters 597

14.4 Bandpass Filters 602

14.5 Bandreject Filters 613

Practical Perspective: Pushbutton Telephone Circuits 618

Summary 619

Problems 619

Chapter 15 Active Filter Circuits 626

Practical Perspective: Bass Volume Control 627

15.1 First-Order Low-Pass and High-Pass Filters 628

15.2 Scaling 632

15.3 Op Amp Bandpass and Bandreject Filters 635

15.4 Higher Order Op Amp Filters 642

15.5 Narrowband Bandpass and Bandreject Filters 656

Practical Perspective: Bass Volume Control 662

Summary 664

Problems 666

Chapter 16 Fourier Series 676

16.1 Fourier Series Analysis: An Overview 678

16.2 The Fourier Coefficients 679

16.3 The Effect of Symmetry on the Fourier Coefficients 682

16.4 An Alternative Trigonometric Form of the Fourier Series 688

16.5 An Application 690

16.6 Average-Power Calculations with Periodic Functions 695

16.7 The rms Value of a Periodic Function 698

16.8 The Exponential Form of the Fourier Series 699

16.9 Amplitude and Phase Spectra 702

Summary 705

Problems 706

Chapter 17 The Fourier Transform 718

17.1 The Derivation of the Fourier Transform 719

17.2 The Convergence of the Fourier Integral 721

17.3 Using Laplace Transforms to Find Fourier Transforms 723

17.4 Fourier Transforms in the Limit 726

17.5 Some Mathematical Properties 728

17.6 Operational Transforms 730

- 17.7 Circuit Applications 734
- 17.8 Parseval's Theorem 737
 - Summary 744
 - Problems 745

Chapter 18 Two-Port Circuits 750

- 18.1 The Terminal Equations 751
- 18.2 The Two-Port Parameters 752
- 18.3 Analysis of the Terminated Two-Port Circuit 761
- 18.4 Interconnected Two-Port Circuits 767
 - Summary 771
 - Problems 772

Appendix A The Solution of Linear Simultaneous Equations 779

- A.1 Preliminary Steps 779
- A.2 Cramer's Method 780
- A.3 The Characteristic Determinant 780
- A.4 The Numerator Determinant 780
- A.5 The Evaluation of a Determinant 781
- A.6 Matrices 784
- A.7 Matrix Algebra 785
- A.8 Identity, Adjoint, and Inverse Matrices 790
- A.9 Partitioned Matrices 792
- A.10 Applications 796

Appendix B Complex Numbers 801

- B.1 Notation 801
- B.2 The Graphical Representation of a Complex Number 802
- B.3 Arithmetic Operations 803
- B.4 Useful Identities 805
- B.5 The Integer Power of a Complex Number 805
- B.6 The Roots of a Complex Number 806

Appendix C More on Magnetically Coupled Coils and Ideal Transformers 807

- C.1 Equivalent Circuits for Magnetically Coupled Coils 807
- C.2 The Need for Ideal Transformers in the Equivalent Circuits 812

Appendix D The Decibel 817

Appendix E Bode Diagrams 819

- E.1 Real, First-Order Poles and Zeros 819
- E.2 Straight-Line Amplitude Plots 820
- E.3 More Accurate Amplitude Plots 824
- E.4 Straight-Line Phase Angle Plots 825
- E.5 Bode Diagrams: Complex Poles and Zeros 827
- E.6 Amplitude Plots 829
- E.7 Correcting Straight-Line Amplitude Plots 830
- E.8 Phase Angle Plots 833

Appendix F An Abbreviated Table of Trigonometric Identities 837

Appendix G An Abbreviated Table of Integrals 839

Appendix H Answers to Selected Problems 841

Index 859

List of Examples

Chapter 2

- 2.1 Testing Interconnections of Ideal Sources 46
- 2.2 Testing Interconnections of Ideal Independent and Dependent Sources 47
- 2.3 Calculating Voltage, Current, and Power for a Simple Resistive Circuit 51
- 2.4 Constructing a Circuit Model of a Flashlight 53
- 2.5 Constructing a Circuit Model Based on Terminal Measurements 55
- 2.6 Using Kirchhoff's Current Law 59
- 2.7 Using Kirchhoff's Voltage Law 59
- 2.8 Applying Ohm's Law and Kirchhoff's Laws to Find an Unknown Current 60
- 2.9 Constructing a Circuit Model Based on Terminal Measurements 61
- 2.10 Applying Ohm's Law and Kirchhoff's Laws to Find an Unknown Voltage 64
- 2.11 Applying Ohm's Law and Kirchhoff's Law in an Amplifier Circuit 65

Chapter 3

- 3.1 Applying Series-Parallel Simplification 81
- 3.2 Analyzing the Voltage-Divider Circuit 83
- 3.3 Analyzing a Current-Divider Circuit 84
- 3.4 Using Voltage Division and Current Division to Solve a Circuit 87
- 3.5 Using a d'Arsonval Ammeter 89
- 3.6 Using a d'Arsonval Voltmeter 90
- 3.7 Applying a Delta-to-Wye Transform 95

Chapter 4

- 4.1 Identifying Node, Branch, Mesh, and Loop in a Circuit 115
- 4.2 Using the Node-Voltage Method 119
- 4.3 Using the Node-Voltage Method with Dependent Sources 120
- 4.4 Using the Mesh-Current Method 126
- 4.5 Using the Mesh-Current Method with Dependent Sources 128

- 4.6 Understanding the Node-Voltage Method Versus Mesh-Current Method 133
- 4.7 Comparing the Node-Voltage and Mesh-Current Methods 135
- 4.8 Using Source Transformations to Solve a Circuit 137
- 4.9 Using Special Source Transformation Techniques 138
- 4.10 Finding the Thévenin Equivalent of a Circuit with a Dependent Source 142
- 4.11 Finding the Thévenin Equivalent Using a Test Source 144
- 4.12 Calculating the Condition for Maximum Power Transfer 148
- 4.13 Using Superposition to Solve a Circuit 152

Chapter 5

- 5.1 Analyzing an Op Amp Circuit 180

Chapter 6

- 6.1 Determining the Voltage, Given the Current, at the Terminals of an Inductor 209
- 6.2 Determining the Current, Given the Voltage, at the Terminals of an Inductor 211
- 6.3 Determining the Current, Voltage, Power, and Energy for an Inductor 213
- 6.4 Determining Current, Voltage, Power, and Energy for a Capacitor 217
- 6.5 Finding v , p , and w Induced by a Triangular Current Pulse for a Capacitor 218
- 6.6 Finding Mesh-Current Equations for a Circuit with Magnetically Coupled Coils 226

Chapter 7

- 7.1 Determining the Natural Response of an RL Circuit 254
- 7.2 Determining the Natural Response of an RL Circuit with Parallel Inductors 255
- 7.3 Determining the Natural Response of an RC Circuit 258

- 7.4 Determining the Natural Response of an *RC* Circuit with Series Capacitors 259
- 7.5 Determining the Step Response of an *RL* Circuit 264
- 7.6 Determining the Step Response of an *RC* Circuit 267
- 7.7 Using the General Solution Method to Find an *RC* Circuit's Step Response 270
- 7.8 Using the General Solution Method with Zero Initial Conditions 271
- 7.9 Using the General Solution Method to Find an *RL* Circuit's Step Response 272
- 7.10 Determining the Step Response of a Circuit with Magnetically Coupled Coils 273
- 7.11 Analyzing an *RL* Circuit that has Sequential Switching 275
- 7.12 Analyzing an *RC* Circuit that has Sequential Switching 277
- 7.13 Finding the Unbounded Response in an *RC* Circuit 279
- 7.14 Analyzing an Integrating Amplifier 281
- 7.15 Analyzing an Integrating Amplifier that has Sequential Switching 282

Chapter 8

- 8.1 Finding the Roots of the Characteristic Equation of a Parallel *RLC* Circuit 310
- 8.2 Finding the Overdamped Natural Response of a Parallel *RLC* Circuit 313
- 8.3 Calculating Branch Currents in the Natural Response of a Parallel *RLC* Circuit 314
- 8.4 Finding the Underdamped Natural Response of a Parallel *RLC* Circuit 317
- 8.5 Finding the Critically Damped Natural Response of a Parallel *RLC* Circuit 320
- 8.6 Finding the Overdamped Step Response of a Parallel *RLC* Circuit 324
- 8.7 Finding the Underdamped Step Response of a Parallel *RLC* Circuit 325
- 8.8 Finding the Critically Damped Step Response of a Parallel *RLC* Circuit 325
- 8.9 Comparing the Three-Step Response Forms 326
- 8.10 Finding Step Response of a Parallel *RLC* Circuit with Initial Stored Energy 326
- 8.11 Finding the Underdamped Natural Response of a Series *RLC* Circuit 330

- 8.12 Finding the Underdamped Step Response of a Series *RLC* Circuit 331
- 8.13 Analyzing Two Cascaded Integrating Amplifiers 333
- 8.14 Analyzing Two Cascaded Integrating Amplifiers with Feedback Resistors 336

Chapter 9

- 9.1 Finding the Characteristics of a Sinusoidal Current 354
- 9.2 Finding the Characteristics of a Sinusoidal Voltage 354
- 9.3 Translating a Sine Expression to a Cosine Expression 354
- 9.4 Calculating the rms Value of a Triangular Waveform 355
- 9.5 Adding Cosines Using Phasors 361
- 9.6 Combining Impedances in Series 369
- 9.7 Combining Impedances in Series and in Parallel 371
- 9.8 Using a Delta-to-Wye Transform in the Frequency Domain 373
- 9.9 Performing Source Transformations in the Frequency Domain 376
- 9.10 Finding a Thévenin Equivalent in the Frequency Domain 377
- 9.11 Using the Node-Voltage Method in the Frequency Domain 379
- 9.12 Using the Mesh-Current Method in the Frequency Domain 380
- 9.13 Analyzing a Linear Transformer in the Frequency Domain 384
- 9.14 Analyzing an Ideal Transformer Circuit in the Frequency Domain 390
- 9.15 Using Phasor Diagrams to Analyze a Circuit 392
- 9.16 Using Phasor Diagrams to Analyze Capacitive Loading Effects 393

Chapter 10

- 10.1 Calculating Average and Reactive Power 416
- 10.2 Making Power Calculations Involving Household Appliances 418
- 10.3 Determining Average Power Delivered to a Resistor by a Sinusoidal Voltage 420

- 10.4 Calculating Complex Power 422
- 10.5 Calculating Average and Reactive Power 426
- 10.6 Calculating Power in Parallel Loads 427
- 10.7 Balancing Power Delivered with Power Absorbed in an ac Circuit 428
- 10.8 Determining Maximum Power Transfer without Load Restrictions 433
- 10.9 Determining Maximum Power Transfer with Load Impedance Restriction 434
- 10.10 Finding Maximum Power Transfer with Impedance Angle Restrictions 434
- 10.11 Finding Maximum Power Transfer in a Circuit with an Ideal Transformer 435

Chapter 11

- 11.1 Analyzing a Wye-Wye Circuit 460
- 11.2 Analyzing a Wye-Delta Circuit 464
- 11.3 Calculating Power in a Three-Phase Wye-Wye Circuit 469
- 11.4 Calculating Power in a Three-Phase Wye-Delta Circuit 470
- 11.5 Calculating Three-Phase Power with an Unspecified Load 470
- 11.6 Computing Wattmeter Readings in Three-Phase Circuits 474

Chapter 12

- 12.1 Using Step Functions to Represent a Function of Finite Duration 490

Chapter 13

- 13.1 Deriving the Transfer Function of a Circuit 547
- 13.2 Analyzing the Transfer Function of a Circuit 549
- 13.3 Using the Convolution Integral to Find an Output Signal 555
- 13.4 Using the Transfer Function to Find the Steady-State Sinusoidal Response 559

Chapter 14

- 14.1 Designing a Low-Pass Filter 594
- 14.2 Designing a Series *RC* Low-Pass Filter 595
- 14.3 Designing a Series *RL* High-Pass Filter 599

- 14.4 Loading the Series *RL* High-Pass Filter 600
- 14.5 Designing a Bandpass Filter 607
- 14.6 Designing a Parallel *RLC* Bandpass Filter 608
- 14.7 Determining Effect of a Nonideal Voltage Source on a *RLC* Bandpass Filter 609
- 14.8 Designing a Series *RLC* Bandreject Filter 616

Chapter 15

- 15.1 Designing a Low-Pass Op Amp Filter 629
- 15.2 Designing a High-Pass Op Amp Filter 631
- 15.3 Scaling a Series *RLC* Circuit 633
- 15.4 Scaling a Prototype Low-Pass Op Amp Filter 634
- 15.5 Designing a Broadband Bandpass Op Amp Filter 638
- 15.6 Designing a Broadband Bandreject Op Amp Filter 641
- 15.7 Designing a Fourth-Order Low-Pass Op Amp Filter 645
- 15.8 Calculating Butterworth Transfer Functions 648
- 15.9 Designing a Fourth-Order Low-Pass Butterworth Filter 651
- 15.10 Determining the Order of a Butterworth Filter 654
- 15.11 An Alternate Approach to Determining the Order of a Butterworth Filter 654
- 15.12 Designing a High-*Q* Bandpass Filter 658
- 15.13 Designing a High-*Q* Bandreject Filter 661

Chapter 16

- 16.1 Finding the Fourier Series of a Triangular Waveform with No Symmetry 680
- 16.2 Finding the Fourier Series of an Odd Function with Symmetry 687
- 16.3 Calculating Forms of the Trigonometric Fourier Series for Periodic Voltage 689
- 16.4 Calculating Average Power for a Circuit with a Periodic Voltage Source 697
- 16.5 Estimating the rms Value of a Periodic Function 699
- 16.6 Finding the Exponential Form of the Fourier Series 701

Chapter 17

- 17.1** Using the Fourier Transform to Find the Transient Response 735
- 17.2** Using the Fourier Transform to Find the Sinusoidal Steady-State Response 736
- 17.3** Applying Parseval's Theorem 739
- 17.4** Applying Parseval's Theorem to an Ideal Bandpass Filter 740
- 17.5** Applying Parseval's Theorem to a Low-Pass Filter 741

Chapter 18

- 18.1** Finding the z Parameters of a Two-Port Circuit 753
- 18.2** Finding the a Parameters from Measurements 755
- 18.3** Finding h Parameters from Measurements and Table 18.1 758
- 18.4** Analyzing a Terminated Two-Port Circuit 766
- 18.5** Analyzing Cascaded Two-Port Circuits 770

Preface

The eighth edition of *Electric Circuits* is a carefully planned revision to the most widely used introductory circuits text of the past 25 years. As this book has evolved over the years to meet the changing learning styles of students, importantly, the underlying teaching approaches and philosophies remain unchanged. The goals are:

- To build an understanding of concepts and ideas explicitly in terms of previous learning.
- To emphasize the relationship between conceptual understanding and problem-solving approaches.
- To provide students with a strong foundation of engineering practices.

WHY THIS EDITION?

When planning for the eighth edition revision of *Electric Circuits*, careful thought was given to how we should best update this classic text to improve upon the success of preceding editions and make the eighth edition as compelling as the first. Through a thorough review process that included both instructors and students who currently use *Electric Circuits* and those who use other texts, our revision plan was formed. What emerged from this exercise was a clear picture of what matters most to instructors and students. With this feedback in mind, we made the following changes:

- Problem solving is fundamental to the study of circuit analysis. The authors put their primary effort into updating and adding new end-of-chapter problems. The result is a fresh text with approximately 80% new or revised problems compared to the previous edition. Having a wealth of new problems to assign and work is a key to success in any circuits course.
- The eighth edition represents a major redesign to the text. Careful attention was paid toward how to present the material—text, figures, and artwork—in a clean, clear manner that would facilitate learning and encourage reading. The seventh edition was the first introductory circuits text to recognize the changing needs of today's students with a modern, four-color design. The eighth edition refines this color treatment with a more pedagogically coherent presentation.
- Navigation was improved by the addition of page numbers to the chapter objectives, less reliance on icons where names were more effective, and the updated organization of end-of-chapter problems by section levels. Additionally, the layout was enhanced to limit the instances where Examples spill over onto multiple pages.
- All artwork, photos, and images have been modernized and enhanced to present a crisper illustration of the key elements and application of circuit analysis.

- Recognizing that more class preparation and studying is happening online with the use of additional resources, the development of online resources for the eighth edition represents a significant improvement from the seventh edition. From online, automatically graded homework, to study aids and an e-book, all of this and more is now available on an easy-to-navigate website for students and instructors.

College textbooks excel at presenting complicated material in a clear, straightforward manner. Authors and publishers spend countless hours developing the best possible learning aid for students and teaching aid for instructors. Prentice Hall is committed to working with authors to create textbooks and supporting resources that enable better teaching and better student learning. The eighth edition of *Electric Circuits* is one such example. It set the standard for circuits education 25 years ago and it continues that trend today.

HALLMARK FEATURES

Chapter Problems

Users of *Electric Circuits* have consistently rated the Chapter Problems as one of the book's most attractive features. In the eighth edition, there are over 1000 problems with approximately 80% that are new or revised from the previous edition. Problems are organized at the end of each chapter by section.

Practical Perspectives

The eighth edition continues the use of Practical Perspective introduced with the chapter openers. They offer examples of real-world circuits, taken from real-world devices. Most chapters begin with a brief description of a practical application of the material that follows. Once the chapter material is presented, the chapter concludes with a quantitative analysis of the application along with a Practical Perspective problem. This enables you to understand how to apply the chapter contents to the solution of a real-world problem.

Assessment Problems

Each chapter begins with a set of chapter objectives. At key points in the chapter, you are asked to stop and assess your mastery of a particular objective by solving one or more assessment problems. If you are able to solve the assessment problems for a given objective, you have mastered that objective.

Examples

Every chapter includes many examples that illustrate the concepts presented in the text in the form of a numeric example. There are over 130 examples in this text. The examples are intended to illustrate the application of a particular concept, and also to encourage good problem-solving skills.