

- Foreword p. xiii
- Acknowledgments p. xv
- Chapter 1 Overview p. 1
- "Do You Really Need to Simulate?" p. 2
- What You Will Find in the Following Pages p. 3
- What You Will NOT Find in This Book p. 4
- What Kind of Models Are Available? p. 5
- Average Models p. 7
- Transient Models p. 7
- Understanding What Averaged Quantity Means p. 8
- State Space Averaged Models p. 10
- The Voltage-Mode PWM Switch p. 13
- The Switched Inductor Model p. 21
- Current Mode Models p. 28
- Current Mode Instabilities p. 29
- Small-Signal Current-Mode Models p. 30
- Continuous Conduction Mode p. 31
- Discontinuous Conduction Mode p. 31
- GSIM Models and Peak Current Mode p. 32
- Minimum Schematic for Average Simulation p. 33
- Closed and Open-Loop Measurements p. 34
- Chapter 2 Generic Models for Faster Simulations p. 37
- Operational Amplifiers p. 38
- The Simplest Model p. 38
- A More Realistic Model p. 40
- Sources with a Given Fan-Out p. 40
- IsSpice p. 42
- PSpice p. 43
- Leading-Edge Blanking p. 43
- Comparator with Hysteresis p. 45
- Transformers p. 46
- Astable Generator p. 48
- A Simple Voltage-Controlled Oscillator p. 48
- Complete Generic Controllers p. 49
- The Berkeley B Element, the Standard Behavioral Element p. 51
- Implement Your Logical Operations p. 52
- Current Mode Controllers, a Well-Known Architecture p. 54
- Writing the Model Step by Step p. 56
- Test of the Complete Current-Mode Model p. 58
- Current Mode Instabilities p. 60
- The Voltage Mode Model p. 63
- The Duty-Cycle Generation p. 63
- A Quick Example with a FORWARD Converter p. 65
- Modeling with SPICEZ p. 67

- Dead-Time Generation p. 69
- Dead-Time Generation with Delay Lines p. 72
- Convergence Options p. 77
- TRANSIENT Simulations p. 77
- AC Simulations p. 78
- Chapter 3 Topology-by-Topology Simulation Recipes p. 79
- Introduction p. 80
- The Critical Inductance p. 81
- Where Is the Boundary? p. 81
- When the Deadtime Vanishes... p. 83
- BOOST Voltage Mode p. 85
- How It Works p. 85
- Equations p. 86
- Averaged p. 87
- Switched p. 88
- BOOST Current Mode p. 90
- How It Works p. 90
- Equations p. 91
- Averaged p. 92
- Switched p. 94
- BUCK Voltage Mode p. 95
- How It Works p. 98
- Equations p. 98
- Averaged p. 98
- Switched p. 101
- BUCK Current Mode p. 102
- Equations p. 104
- Averaged p. 104
- Switched p. 106
- BUCK-BOOST Voltage Mode p. 107
- How It Works p. 107
- Equations p. 110
- Averaged p. 110
- Switched p. 112
- BUCK-BOOST Current Mode p. 114
- Equations p. 115
- Averaged p. 115
- Switched p. 117
- FLYBACK Voltage Mode p. 118
- How It Works p. 121
- Equations p. 121
- Averaged Low-Cost Feedback p. 121
- Averaged, Shunt Regulators p. 123
- Switched p. 126

- FLYBACK Current-Mode p. 127
- Equations p. 127
- Averaged p. 130
- Switched p. 132
- FORWARD Voltage Mode p. 135
- How It Works p. 135
- Equations p. 137
- Averaged p. 138
- Switched p. 140
- FORWARD Current Mode p. 141
- How It Works p. 141
- Equations p. 142
- Averaged p. 142
- Switched p. 143
- PUSH-PULL Voltage Mode p. 146
- How It Works p. 146
- Equations p. 149
- Averaged p. 149
- Switched p. 149
- PUSH-PULL Current Mode p. 149
- How It Works p. 151
- Equations p. 151
- Averaged p. 153
- Switched p. 153
- HALF-BRIDGE Voltage Mode p. 154
- How It Works p. 155
- Equations p. 155
- Averaged p. 157
- Switched p. 157
- HALF-BRIDGE Current Mode p. 159
- How It Works p. 159
- Equations p. 160
- Averaged p. 160
- Switched p. 160
- FULL-BRIDGE Voltage Mode p. 162
- How It Works p. 164
- Equations p. 164
- Averaged p. 164
- Switched p. 165
- FULL-BRIDGE Current-Mode p. 165
- How It Works p. 165
- Equations p. 166
- Averaged p. 166
- Switched p. 167

- Chapter 4 More Complex Simulations p. 171
- The SEPIC p. 172
- Average, Voltage-Mode p. 173
- Average, Current-Mode p. 174
- Switched p. 176
- The Series-Parallel Resonant Converter p. 177
- Average p. 178
- Switched p. 180
- A Critical Mode Controller p. 184
- A Monolithic High-Voltage Application p. 188
- Converters and Differential Electromagnetic Interference p. 190
- How a Parasitic Signal Is Generated p. 191
- Fast Fourier Transforms with SPICE p. 193
- CISPR16 and SPICE p. 194
- Analysis Bandwidths p. 195
- SPICE Simulates the True Current Signature p. 196
- Putting the Models to Work p. 198
- PFC Circuits Simulation with PSIM p. 203
- Chapter 5 Self-Oscillating Power Supplies p. 209
- The Good Old Blocking... p. 210
- Simulation Results p. 211
- Self-Relaxing Power Supply p. 213
- Electronic Ballasts p. 214
- Bipolar Version p. 214
- MOSFET Version p. 216
- A Relaxing FLASH Lamp p. 216
- Hysteretic Power Supplies p. 220
- Defining the Numbers p. 223
- Amplifier Types p. 224
- Closing the Loop p. 226
- Determining the Physical Values of the Two-Winding T-Model p. 231
- The Three-Winding T-Model p. 232
- Determining the Physical Values of the Three-Winding Model p. 233
- Evaluating the Noise Signature p. 235
- Calculating the Required Attenuation p. 239
- The Final Filter Stage p. 241
- Real Measurements Versus Simulated Ones p. 244
- Total Noise Measurement p. 248
- Line Impedance Stabilization Network SPICE netlist p. 249
- IsSpice4 p. 251
- OrCAD PSpice p. 252
- [mu]Cap p. 252
- PSIM p. 252
- Appendix A Applying the K Factor for Quick Pole-Zero Compensation p. 223

- Appendix B Feeding the Transformer Models with Physical Values p. 231
- Appendix C Conducted EMI Filter Design p. 235
- Appendix D CD-ROM Content p. 251
- Bibliography p. 253