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| Nota di contenuto       | Designing Control Loops for Linear and Switching Power Supplies: A Tutorial Guide; Contents; Foreword; Preface; Acknowledgments; Chapter 1 Basics of Loop Control; 1.1 Open-Loop Systems; 1.1.1 Perturbations; 1.2 The Necessity of Control-Closed-Loop Systems; 1.3 Notions of Time Constants; 1.3.1 Working with Time Constants; 1.3.2 The Proportional Term; 1.3.3 The Derivative Term; 1.3.4 The Integral Term; 1.3.5 Combining the Factors; 1.4 Performance of a Feedback Control System; 1.4.1 Transient or Steady State?; 1.4.2 The Step; 1.4.3 The Sinusoidal Sweep; 1.4.4 The Bode Plot.<br>1.5 Transfer Functions1.5.1 The Laplace Transform; 1.5.2 Excitation and Response Signals; 1.5.3 A Quick Example; 1.5.4 Combining Transfer Functions with Bode Plots; 1.6 Conclusion; Selected Bibliography; Chapter 2 Transfer Functions; 2.1 Expressing Transfer Functions; 2.1.1 Writing Transfer Functions the Right Way; 2.1.2 The 0-db Crossover Pole; 2.2 Solving for the Roots; 2.2.1 Poles and Zeros Found by Inspection; 2.2.2 Poles, Zeros, and Time Constants; 2.3 Transient Response and Roots; 2.3.1 When the Roots Are Moving; 2.4 S-Plane and Transient Response. |

2.4.1 Roots Trajectories in the Complex Plane; 2.5 Zeros in the Right Half Plane; 2.5.1 A Two-Step Conversion Process; 2.5.2 The Inductor Current Slew-Rate Is the Limit; 2.5.3 An Average Model to Visualize RHP Zero Effects; 2.5.4 The Right Half Plane Zero in the Boost Converter; 2.6 Conclusion; References; Appendix 2A: Determining a Bridge Input Impedance; Reference; Appendix 2B: Plotting Evans Loci with Mathcad; Appendix 2C: Heaviside Expansion Formulas; Reference; Appendix 2D: Plotting a Right Half Plane Zero with Spice; Chapter 3 Stability Criteria of a Control System. 3.1 Building An Oscillator; 3.1.1 Theory at Work; 3.2 Stability Criteria; 3.2.1 Gain Margin and Conditional Stability; 3.2.2 Minimum Versus Nonminimum-Phase Functions; 3.2.3 Nyquist Plots; 3.2.4 Extracting the Basic Information from the Nyquist Plot; 3.2.5 Modulus Margin; 3.3 Transient Response, Quality Factor, and Phase Margin; 3.3.1 A Second-Order System, the RLC Circuit; 3.3.2 Transient Response of a Second-Order System; 3.3.4 Opening the Loop to Measure the Phase Margin; 3.3.5 The Phase Margin of a Switching Converter; 3.3.6 Considering a Delay in the Conversion Process. 3.3.7 The Delay in the Laplace Domain; 3.3.8 Delay Margin versus Phase Margin; 3.4 Selecting the Crossover Frequency; 3.4.1 A Simplified Buck Converter; 3.4.2 The Output Impedance in Closed-Loop Conditions; 3.4.3 The Closed-Loop Output Impedance at Crossover; 3.4.4 Scaling the Reference to Obtain the Desired Output; 3.4.5 Increasing the Crossover Frequency Further; 3.5 Conclusion; References; Chapter 4 Compensation; 4.1 The PID Compensator; 4.1.1 The PID Expressions in the Laplace Domain; 4.1.2 Practical Implementation of a PID Compensator; 4.1.3 Practical Implementation of a PI Compensator. 4.1.4 The PID at Work in a Buck Converter.

## Sommario/riassunto

Loop control is an essential area of electronics engineering that today's professionals need to master. Rather than delving into extensive theory, this practical book focuses on what you really need to know for compensating or stabilizing a given control system. You can turn instantly to practical sections with numerous design examples and ready-made formulas to help you with your projects in the field. You also find coverage of the underpinnings and principles of control loops so you can gain a more complete understanding of the material. This authoritative volume explains how to conduct anal.