DESCRIPTION

AVERAGE CURRENT-MODE CONTROL OF DC-DC POWER CONVERTERS

An authoritative one-stop guide to the analysis, design, development, and control of a variety of power converter systems

*Average Current-Mode Control of DC-DC Power Converters* provides comprehensive and up-to-date information about average current-mode control (ACMC) of pulse-width modulated (PWM) dc-dc converters. This invaluable one-stop resource covers both fundamental and state-of-the-art techniques in average current-mode control of power electronic converters—featuring novel small-signal models of non-isolated and isolated converter topologies with joint and disjoint switching elements and coverage of frequency and time domain analysis of controlled circuits.

The authors employ a systematic theoretical framework supported by step-by-step derivations, design procedures for measuring transfer functions, challenging end-of-chapter problems, easy-to-follow diagrams and illustrations, numerous examples for different power supply specifications, and practical tips for developing power-stage small-signal models using circuit-averaging techniques. The text addresses all essential aspects of modeling, design, analysis, and simulation of average current-mode control of power converter topologies, such as buck, boost, buck-boost, and flyback converters in operating continuous-conduction mode (CCM). Bridging the gap between fundamental modeling methods and their application in a variety of switched-mode power supplies, this book:

- Discusses the development of small-signal models and transfer functions related to the inner current and outer voltage loops
- Analyzes inner current loops with average current-mode control and describes their dynamic characteristics
• Presents dynamic properties of the poles and zeros, time-domain responses of the control circuits, and comparison of relevant modeling techniques

• Contains a detailed chapter on the analysis and design of control circuits in time-domain and frequency-domain

• Provides techniques required to produce professional MATLAB plots and schematics for circuit simulations, including example MATLAB codes for the complete design of PWM buck, boost, buck-boost, and flyback DC-DC converters

• Includes appendices with design equations for steady-state operation in CCM for power converters, parameters of commonly used power MOSFETs and diodes, SPICE models of selected MOSFETs and diodes, simulation tools including introductions to SPICE, MATLAB, and SABER, and MATLAB codes for transfer functions and transient responses

*Average Current-Mode Control of DC-DC Power Converters* is a must-have reference and guide for researchers, advanced graduate students, and instructors in the area of power electronics, and for practicing engineers and scientists specializing in advanced circuit modeling methods for various converters at different operating conditions.

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**ABOUT THE AUTHOR**

**Marian K. Kazimierczuk, PhD,** Professor of Electrical Engineering, Wright State University, Dayton, Ohio, USA. He has taught undergraduate and graduate electronics courses in the field of high-frequency power electronics for more than 35 years. Professor Kazimierczuk has performed an extensive research on PWM and resonant power converters, electronic ballasts, high-frequency magnetic components, high-efficiency RF power amplifiers, modeling and control of power converters, active power factor correction, wireless power transfer, renewable energy sources, power MOSFET drivers, and wide-bandgap GaN and SiC semiconductor devices. He has published over 500 papers in *IEEE Transactions, IET journals,* and *IEEE international conferences,* has written eight textbooks, and holds 7 patents. He is a Life Fellow of the IEEE.

**Dalvir K. Saini, PhD,** Research Engineer, Failure Analysis Lab, University of Dayton Research Institute, Wright Patterson Air Force Base, Dayton, Ohio, USA. She has been pursuing the area of failure analysis of electrical systems and components related to aircraft safety, and has published several journal and conference publications in the field of modeling of switched-mode power converters.

**Agasthya Ayachit, PhD,** Senior System Engineer, Mercedes-Benz Research & Development North America, Redford, Michigan, USA. He has been actively contributing to the design and development of power conversion stages in electric vehicle battery charging and e-drive systems. He has published several journal papers in *IEEE Transactions, IET journals,* and *IEEE conferences*
in the field of small-signal modeling of power converters. His research interests are in the field of circuit topologies, modeling and
design of power converters, wireless charging, and wide-bandgap semiconductor devices (GaN/SiC).

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