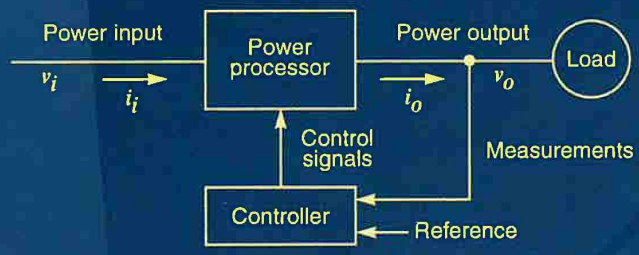
Second Edition

POWER ELECTRONICS

Converters, Applications, and Design



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PREFACE

SECOND EDITION

The first edition of this book was published in 1989. The basic intent of this edition remains the same; that is, as a cohesive presentation of power electronics fundamentals for applications and design in the power range of 500 kW or less, where a huge market exists and where the demand for power electronics engineers is likely to be. Based on the comments collected over a five-year period, we have made a number of substantial changes to the text. The key features are as follows:

- An introductory chapter has been added to provide a review of basic electrical and magnetic circuit concepts, making it easier to use this book in introductory power electronics courses.
- A chapter on computer simulation has been added that describes the role of computer simulations in power electronics. Examples and problems based on PSpice® and MATLAB® are included. However, we have organized the material in such a way that any other simulation package can be used instead or the simulations can be skipped altogether.
- Unlike the first edition, the diode rectifiers and the phase-controlled thyristor converters are covered in a complete and easy-to-follow manner. These two chapters now contain 56 problems.
- A new chapter on the design of inductors and transformers has been added that describes easy-to-understand concepts for step-by-step design procedures. This material will be extremely useful in introducing the design of magnetics into the curriculum.
- A new chapter on heat sinks has been added.

ORGANIZATION OF THE BOOK

This book is divided into seven parts. Part 1 presents an introduction to the field of power electronics, an overview of power semiconductor switches, a review of pertinent electric and magnetic circuit concepts, and a generic discussion of the role of computer simulations in power electronics.

Part 2 discusses the generic converter topologies that are used in most applications. The actual semiconductor devices (transistors, diodes, and so on) are assumed to be ideal, thus allowing us to focus on the converter topologies and their applications.

Part 3 discusses switch-mode dc and uninterruptible power supplies. Power supplies represent one of the major applications of power electronics.

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