TZE-FUN CHAN | KELI SHI

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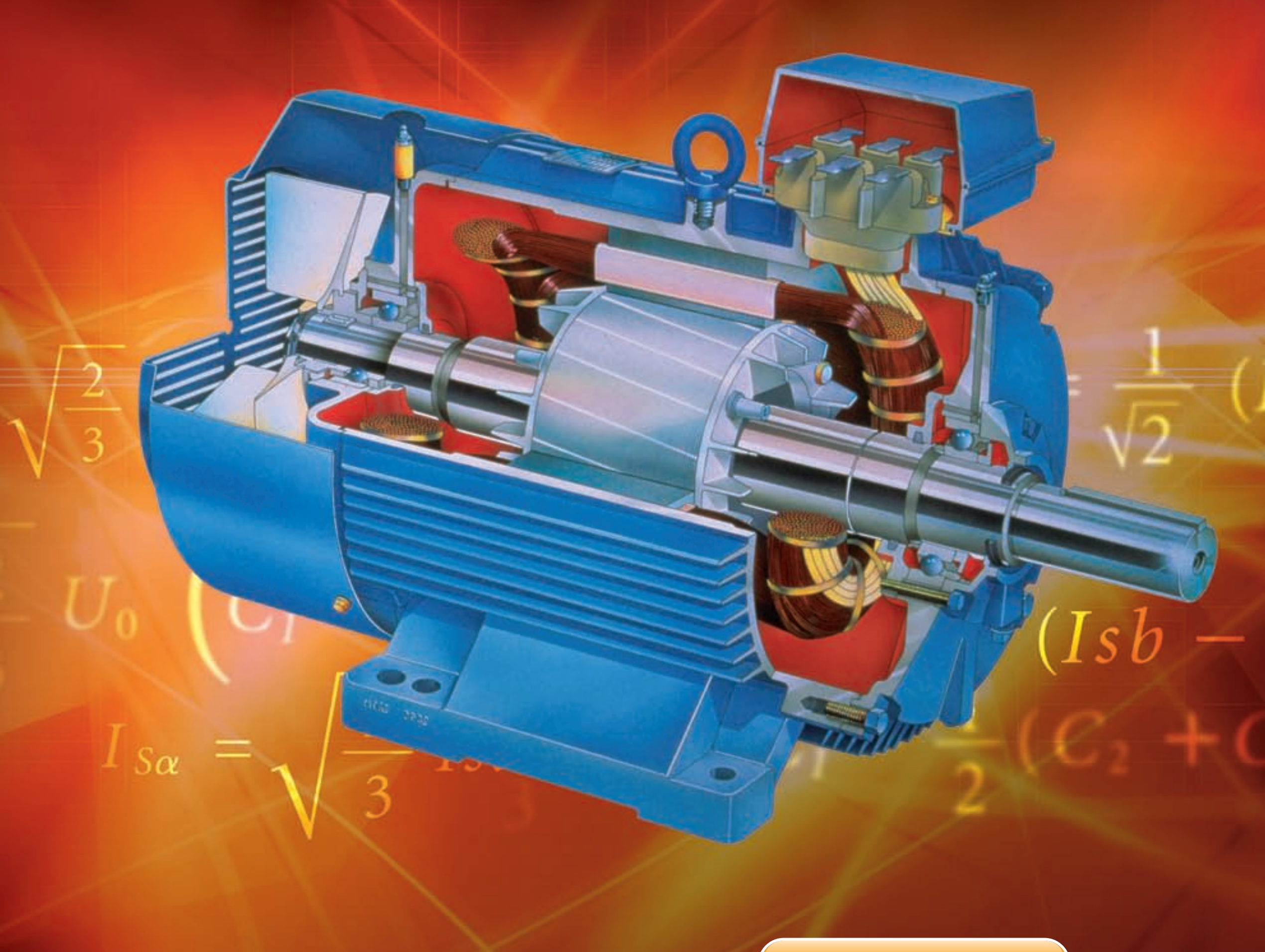

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Contents

Preface

Induction motors are the most important workhorses in industry and they are manufactured in large numbers. About half of the electrical energy generated in a developed country is ultimately consumed by electric motors, of which over 90 % are induction motors. For a relatively long period, induction motors have mainly been deployed in constant-speed motor drives for general purpose applications. The rapid development of power electronic devices and converter technologies in the past few decades, however, has made possible efficient speed control by varying the supply frequency, giving rise to various forms of adjustable-speed induction motor drives. In about the same period, there were also advances in control methods and artificial intelligence (AI) techniques, including expert system, fuzzy logic, neural networks and genetic algorithm. Researchers soon realized that the performance of induction motor drives can be enhanced by adopting artificial-intelligence-based methods. Since the 1990s, AI-based induction motor drives have received greater attention and numerous technical papers have been published. Speed-sensorless induction drives have also emerged as an important branch of induction motor research. A few good reference books on intelligent control and power electronic drives were written. Some electric drive manufacturers began to incorporate AI-control in their commercial products.

This book aims to explore possible areas of induction motor control that require further investigation and development and focuses on the application of intelligent control principles and algorithms in order to make the controller independent of, or less sensitive to, motor parameter changes. Intelligent control is becoming an important and necessary method to solve difficult problems in control of induction motor drives. Based on classical electrical machine and control theory, the authors have investigated the applications of expert-system control, fuzzy-logic control, neural-network control, and genetic algorithm to various forms of induction motor drive.

This book is the result of over fifteen years of research on intelligent control of induction motors undertaken by the authors at the Department of Electrical Engineering, the Hong Kong Polytechnic University and the United States. The methods are original and most of the work has been published in IEEE Transactions and international conferences. In the past few years, our publications have been increasingly cited by Science Citation Index journal papers, showing that our work is being rigorously followed up by the induction motor drives research community.

We believe that the publication of a book or monograph summarizing our latest research findings on intelligent control will benefit the research community. This book will complement