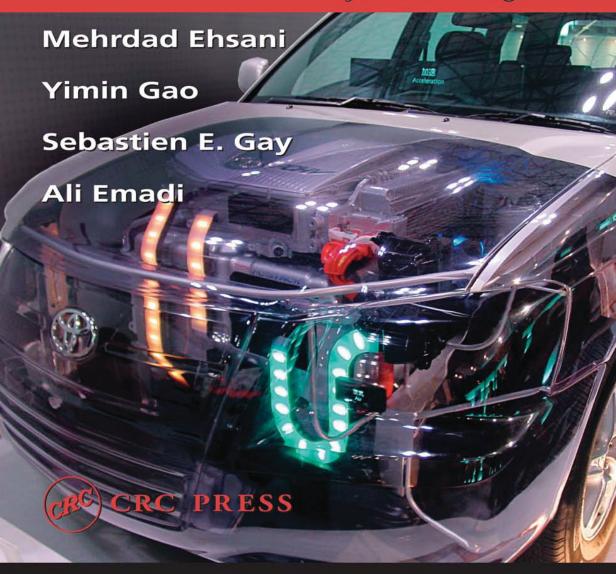
Modern Electric, Hybrid Electric, and Fuel Cell Vehicles

Fundamentals, Theory, and Design





Modern Electric, Hybrid Electric, and Fuel Cell Vehicles

Fundamentals, Theory, and Design



POWER ELECTRONICS AND APPLICATIONS SERIES

Muhammad H. Rashid, Series Editor University of West Florida

PUBLISHED TITLES

Complex Behavior of Switching Power ConvertersChi Kong Tse

DSP-Based Electromechanical Motion Control Hamid A.Toliyat and Steven Campbell

Advanced DC/DC Converters Fang Lin Luo and Hong Ye

Renewable Energy Systems: Design and Analysis with Induction Generators
M. Godoy Simões and Felix A. Farret

Uninterruptible Power Supplies and Active Filters Ali Emadi, Abdolhosein Nasiri, and Stoyan B. Bekiarov

Electric Energy: An Introduction Mohamed El-Sharkawi



Modern Electric, Hybrid Electric, and Fuel Cell Vehicles

Fundamentals, Theory, and Design

Mehrdad Ehsani, Texas A&M University

Yimin Gao, Texas A&M University

Sebastien E. Gay, Texas A&M University

Ali Emadi, Illinois Institute of Technology



Boca Raton London New York Washington, D.C.



Library of Congress Cataloging-in-Publication Data

Modern electric, hybrid electric, and fuel cell vehicles: fundamentals, theory, and design/Mehrdad Ehsani ... [et al.].

p. cm. - (Power electronics and applications series)

Includes bibliographical references and index.

ISBN 0-8493-3154-4 (alk. paper)

1. Hybrid electric vehicles. 2. Fuel cells. I. Ehsani, Mehrdad. II. Title. III. Series.

TL221.15.G39 2004 629.22′93—dc22

2004054249

This book contains information obtained from authentic and highly regarded sources. Reprinted material is quoted with permission, and sources are indicated. A wide variety of references are listed. Reasonable efforts have been made to publish reliable data and information, but the author and the publisher cannot assume responsibility for the validity of all materials or for the consequences of their use.

Neither this book nor any part may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, microfilming, and recording, or by any information storage or retrieval system, without prior permission in writing from the publisher.

The consent of CRC Press LLC does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific permission must be obtained in writing from CRC Press LLC for such copying.

Direct all inquiries to CRC Press LLC, 2000 N.W. Corporate Blvd., Boca Raton, Florida 33431.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation, without intent to infringe.

Visit the CRC Press Web site at www.crcpress.com

© 2005 by CRC Press LLC No claim to original U.S. Government works

International Standard Book Number 0-8493-3154-4 Library of Congress Card Number 2004054249 Printed in the United States of America 1 2 3 4 5 6 7 8 9 0

Printed on acid-free naner



DOCKET

Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.

