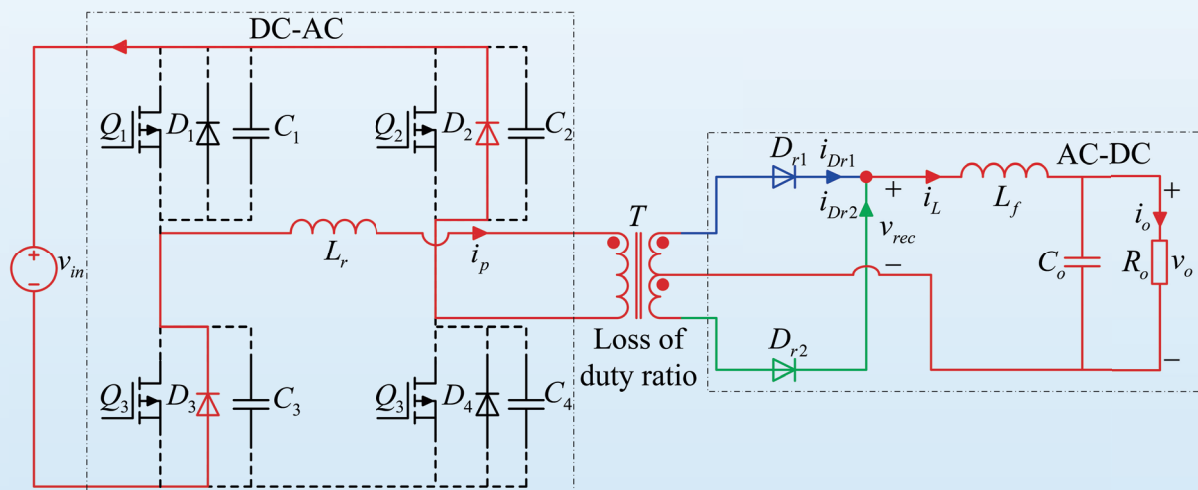


JPE JOURNAL OF POWER ELECTRONICS



Journal of Power Electronics

Editor-in-Chief

Jung-Ik Ha, Seoul National University, Seoul, Korea

Editors

Honnyong Cha, Kyungpook National University, Daegu, Korea

Sung-Jin Choi, *Publication Editor*, University of Ulsan, Ulsan, Korea

Kyo-Beum Lee, *Publication Editor*, Ajou University, Suwon, Korea

Young-Doo Yoon, Hanyang University, Seoul, Korea

Associate Editors

Dukju Ahn, Incheon National University, Incheon, Korea

Seon-Ju Ahn, Chonnam National University, Daejeon, Korea

Dianov Anton, Samsung Electronics, Suwon, Korea

Jong-Bok Baek, Korea Institute of Energy Research, Daejeon, Korea

Wu Chen, Southeast University, Nanjing, China

Chun-An Cheng, I-Shou University, Kaohsiung, Taiwan

Younghoon Cho, Konkuk University, Seoul, Korea

Pooya Davari, Aalborg University, Aalborg, Denmark

Xiaoqiang Guo, Yanshan University, Qinhuangdao, China

Yang Han, University of Electronic Science and Technology of China, Chengdu, China

Seon-Hwan Hwang, Kyungnam University, Changwon, Korea

Jee-Hoon Jung, UNIST, Ulsan, Korea

Byungtaek Kim, Kunsan National University, Gunsan, Korea

Jaehong Kim, Chosun University, Gwangju, Korea

Jonghoon Kim, Chungnam National University, Daejeon, Korea

Sangshin Kwak, Chung-ang University, Seoul, Korea

Byoung-Hee Lee, Hanbat National University, Daejeon, Korea

Dong-Hee Lee, Kyungsung University, Busan, Korea

June-Seok Lee, Korea Railroad Research Institute, Uiwang, Korea

Kwang-Woon Lee, Mokpo National Maritime University, Mokpo, Korea

Seongjun Lee, Chosun University, Gwangju, Korea

Wook-Jin Lee, Chungnam National University, Daejeon, Korea

Zixin Li, University of Chinese Academy of Sciences, Beijing, China

Fuxin Liu, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Hao Ma, Zhejiang University, Hangzhou, China

Saad Mekhilef, University of Malaya, Kuala Lumpur, Malaysia

Jinyeong Moon, Florida State University, Tallahassee, USA

Woonki Na, California State University, Fresno, USA

Minh-Khai Nguyen, Chosun University, Gwangju, Korea

Jeong-Hu Park, Soongsil University, Seoul, Korea

N. Prabaharan, SASTRA Deemed University, Thanjavur, India

Mattia Ricco, Alma Mater Studiorum University of Bologna, Bologna, Italy

Gab-Su Seo, Power Systems Engineering Center, National Renewable Energy Laboratory, Golden, USA

Jongwon Shin, Chung-Ang University, Seoul, Korea

Kai Song, Harbin Institute of Technology, Harbin, China

Kai Sun, Tsinghua University, Beijing, China

Xiaodong Sun, Jiangsu University, Zhenjiang, China

Mahinda Vilathgamuwa, Queensland University of Technology, Brisbane, Australia

Gaolin Wang, Harbin Institute of Technology, Harbin, China

Yijie Wang, Harbin Institute of Technology, Harbin, China

Zheng Wang, Southeast University, Wuxi, China

Huiqing Wen, Xi'an Jiaotong-Liverpool University, Suzhou, China

Hongfei Wu, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Xuerong Ye, Harbin Institute of Technology, Harbin, China

Kang-Hyun Yi, Daegu University, Gyeongsan, Korea

Zhonggang Yin, Xi'an University of Technology, Xi'an, China

Sang-Won Yoon, Hanyang University, Seoul, Korea

Liqliang Yuan, Tsinghua University, Beijing, China

Guoqiang Zhang, Harbin Institute of Technology, Harbin, China

Li Zhang, Hohai University, Nanjing, China

Yongchang Zhang, North China University of Technology, Beijing, China

Xueguang Zhang, Harbin Institute of Technology, Harbin, China

Yun Zhang, Tianjin University, Tianjin, China

Advisory Board

Subhashish Bhattacharya, North Carolina State University, North Carolina, USA

Frede Blaabjerg, Aalborg University, Aalborg, Denmark

Dushan Boroyevich, Virginia Polytechnic Institute and State University, Blacksburg, USA

Liuchen Chang, University of New Brunswick, New Brunswick, Canada

Po-Tai Cheng, National Tsing Hua University, Hsinchu, Taiwan

Bo-Hyung Cho, Seoul National University, Seoul, Korea

Jaeho Choi, Chungbuk National University, Cheongju, Korea

Ilhami Colak, Nisantasi University, Istanbul, Turkey

Braham Ferreira, Delft University of Technology, Delft, Netherlands

Dong-Seok Hyun, Hanyang University, Seoul, Korea

Atsuo Kawamura, Yokohama National University, Yokohama, Japan

Marian P. Kazmierkowski, Warsaw University of Technology, Warsaw, Poland

Ralph Kennel, Technical University of Munchen, Munchen, Germany

Johan W. Kolar, Swiss Federal Institute of Tech., Zurich, Switzerland

Fujio Kurokawa, Nagasaki Institute of Applied Science, Nagasaki, Japan

Dong-Choon Lee, Yeungnam University, Gyeongsan, Korea

Tsorong-Juu Liang, National Cheng-Kung University, Tainan City, Taiwan

Jinjun Liu, Xi'an Jiaotong University, Xi'an, China

Sanjib Kumar Panda, National University of Singapore, Singapore

Fang Z. Peng, Michigan State University, East Lansing, USA

John Shen, Illinois Institute of Technology, Chicago, USA

Toshihisa Shimizu, Tokyo Metropolitan University, Tokyo, Japan

Seung-Ki Sul, Seoul National University, Seoul, Korea

Jian Sun, Rensselaer Polytechnic Institute, New York, USA

Pat Wheeler, University of Nottingham, Nottingham, UK

Dehong Xu, Zhejiang University, Hangzhou, China

Managing Editor

Sejin Jung, The Korean Institute of Power Electronics Administrative Office, Seoul, Korea

Journal of Power Electronics

Aims and Scope

The *Journal of Power Electronics (JPE)* publishes papers of a high technical standard with a suitable balance of practice and theory. It covers a wide range of applications and apparatus in the power electronics field. The scope of the JPE includes the following:

- Low Power Converter
- High Power Converters
- Motor Drives
- Grid and Power Quality
- Energy Management Systems
- Device, Modeling, and Control
- Consumer Power Electronics
- Emerging Power Electronics

The official abbreviation is *J. Power Electron.*

Copyright Information

For Authors

As soon as an article is accepted for publication, authors will be requested to assign copyright of the article (or to grant exclusive publication and dissemination rights) to the publisher (respective the owner if other than Springer Nature). This will ensure the widest possible protection and dissemination of information under copyright laws.

More information about copyright regulations for this journal is available at www.springer.com/43236

For Readers

While the advice and information in this journal is believed to be true and accurate at the date of its publication, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may have been made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored

on microfilm, in electronic data bases, on video disks, etc., without first obtaining written permission from the publisher (respective the copyright owner if other than Springer Nature). The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

Springer Nature has partnered with Copyright Clearance Center's RightsLink service to offer a variety of options for reusing Springer Nature content. For permission to reuse our content please locate the material that you wish to use on link.springer.com or on springerimages.com and click on the permissions link or go to copyright.com and enter the title of the publication that you wish to use. For assistance in placing a permission request, Copyright Clearance Center can be contacted directly via phone: +1-855-239-3415, fax: +1-978-646-8600, or e-mail: info@copyright.com

© The Korean Institute of Power Electronics 2020

Journal Website

www.jpels.org
www.springer.com/43236
Electronic edition:
link.springer.com/journal/43236

Subscription Information

Journal of Power Electronics is published six times a year. Volume 20 (6 issues) will be published in 2020.

ISSN: 1598-2092 print
ISSN: 2093-4718 electronic

For information on subscription rates please contact Springer Nature Customer Service Center:
customerservice@springernature.com

The Americas (North, South, Central America and the Caribbean)
Springer Nature Journal Fulfillment
233 Spring Street, New York
NY 10013-1578, USA
Tel.: 800-SPRINGER (777-4643);
212-460-1500 (outside North America)

Outside the Americas
Springer Nature Customer Service Center
GmbH, Tiergartenstraße 15,
69121 Heidelberg, Germany
Tel.: +49-6221-345-4303

Advertisements

E-mail contact: anzeigen@springer.com

Disclaimer

Springer Nature publishes advertisements in this journal in reliance upon the responsibility of the advertiser to comply with all legal requirements relating to the marketing and sale of products or services advertised. Springer Nature and the editors are not responsible for claims made in the advertisements published in the journal. The appearance of advertisements in Springer Nature publications does not constitute endorsement, implied or intended, of the product advertised or the claims made for it by the advertiser.

Office of Publication

Springer Nature Singapore Pte Ltd. /
Springer Singapore

Springer is part of
Springer Science+Business Media

Funding

This work was supported by the Korean Federation of Science and Technology Societies Grant funded by the Korean Government (Ministry of Education)

Co-Publisher

The Korean Institute of Power Electronics

Dynamic modeling, sensitivity assessment, and design of VSC-based microgrids with composite loads

Z. Zhao · P. Yang · N. Bottrell · L.L. Lai · T.C. Green 245

Strategies of voltage controllers in delta-connected H-bridge STATCOMs

G.T. Son · S.-M. Baek 260

ENERGY MANAGEMENT SYSTEMS

Lithium-ion batteries remaining useful life prediction using Wiener process and unscented particle filter

R. Wang · H. Feng 270

Fixed-frequency phase-shift modulated PV-MPPT for LLC resonant converters

O. Abdel-Rahim · N. Alamir · M. Orabi · M. Ismeil 279

Lithium-ion battery state of charge and parameters joint estimation using cubature Kalman filter and particle filter

W. Xu · J. Xu · X. Yan 292

Battery–inductor–supercapacitor hybrid energy storage system for DC microgrids

D.-H. Dam · H.-H. Lee 308

DEVICE, MODELING AND CONTROL

Gate driver for parallel connection SiC MOSFETs with over-current protection and dynamic current balancing scheme

Y. Zhang · Q. Song · X. Tang · Y. Zhang 319

Machine learning approach for sorting SiC MOSFET devices for paralleling

J.O. Abuogo · Z. Zhao 329

Cover Illustration Fig 1. Schematic diagram of PSFB-DC/DCC:

To acknowledge the academic contribution of Yu Zhang, Yiming Zhang, and Xuhong Wang for the paper entitled “Comparative Study on Predictive Dead-Beat Peak Current, Valley Current and Average Current Control Algorithms for Phase-Shifted Full-Bridge DC/DC Converters”.

Further articles can be found at link.springer.com

Indexed in *Astrophysics Data System (ADS)*, *EBSCO Discovery Service*, *El Compendex*, *Google Scholar*, *Institute of Scientific and Technical Information of China*, *Journal Citation Reports/Science Edition*, *Naver*, *OCLC WorldCat Discovery Service*, *ProQuest-ExLibris Primo*, *ProQuest-ExLibris Summon*, *SCImago*, *SCOPUS*, *Science Citation Index Expanded (SciSearch)*

Instructions for Authors for *J. Power Electron.* are available at www.springer.com/43236

LOW POWER CONVERTERS

Non-isolated input-series-output-parallel three-level buck converter

J. Chen · C. Duan · C. Wang 1

Highly effective leakage magnetic field suppression by using a reactive coil in perfectly aligned EV wireless charging systems

G. Zhu · D. Gao 11

Magnetic field optimization for high-positioning-tolerant wireless charging platforms

T. Wang · C. Yang 22

Pre-calculated duty cycle optimization method based on genetic algorithm implemented in DSP for a non-inverting buck-boost converter

Z. Ortatepe · A. Karaarslan 34

Real-time online optimal control of current-fed dual active bridges based on machine learning

M. Han · X. Liu · H. Pu · L. Zhao · K. Wang · D. Xu 43

High step-up three-level DC–DC converter with three-winding coupled-inductor

X. Ding · D. Zhao · Y. Liu · K. Li · Y. Hao 53

Reconfigurable DDP-type transmitter coil for electric vehicle wireless charging under misaligned conditions

F. Wen · Q. Li · R. Li · L. Liu · T. Wang · L. Liu · T. Wu · Y. Li 65

A bidirectional DC/DC converter with wide-voltage gain range and low-voltage stress for hybrid-energy storage systems in electric vehicles

Z. Wang · P. Wang · H. Bi · M. Qiu 76

Comparative study on predictive dead-beat peak current, valley current and average current control algorithms for phase-shifted full-bridge DC/DC converters

Y. Zhang · Y. Zhang · X. Wang 87

HIGH POWER CONVERTERS

Performance study of various discontinuous PWM strategies for multilevel inverters using generalized space vector algorithm

A.S. Kumar · K.S. Gowri · M.V. Kumar 100

DC-link voltage balance control method considering the wide regulation range in SOR for single-phase cascaded H-bridge rectifier

X. Wang · C. Wang · C. Gu 109

Logic pattern-based low-frequency pulse generation technique for modified multilevel DC-link inverters

N.K. Pilli · S.K. Singh 121

ADJUSTABLE SPEED DRIVERS

Position control for sliding roof systems to reduce vibration

J.-P. Jeong · D.-H. Lee 133

MOTOR DRIVES

Observer-based load current sensorless control strategy of inverter circuit in three-phase UPS

J. Chang · L. Xiao 142

Optimization of maximum torque output in the wide speed range of a PMSM traction control system

W. Zhang · F. Xiao · J. Liu · Z. Mai · C. Li 152

Internal model control of induction motors based on extended state observer

J. Liu · Z. Yin · C. Bai · N. Du 163

Multi-step model predictive current control of permanent-magnet synchronous motor

Y. Xu · Y. Sun · Y. Hou 176

GRID AND POWER QUALITY

DSP-based implementation of improved deadbeat control for three-phase shunt active power filters

M. Ferhat · L. Rahmani · B. Babes 188

Direct AC voltage control for grid-forming inverters

T. Qoria · C. Li · K. Oue · F. Gruson · F. Colas · X. Guillaud 198

Improved virtual quadrature-coordinate EPLL considering input harmonics and DC offset

D. Yin · G. Wang · F. Wu · Z. Guo 212

Harmonic resonance analysis and stability improvement for grid-connected inverters

B. Xie · L. Zhou · T. Liu · M. Mao 221

Double-voltage vector-based model predictive control for three-phase grid-connected AC/DC converters

L. Guo · K. Zhang · Y. Li · N. Jin 236

Contents continued on inside back cover

Table of Contents

Journal of Power Electronics Vol. 20, No. 1 January 2020

Low Power Converters

Non-isolated input-series–output-parallel three-level buck converter	Jianfei Chen, Chen Duan, Caisheng Wang	1
Highly effective leakage magnetic field suppression by using a reactive coil in perfectly aligned EV wireless charging systems	Guodong Zhu, Dawei Gao	11
Magnetic field optimization for high-positioning-tolerant wireless charging platforms	Tianlei Wang, Canjun Yang	22
Pre-calculated duty cycle optimization method based on genetic algorithm implemented in DSP for a non-inverting buck-boost converter	Zafer Ortatepe, Ahmet Karaarslan	34
Real-time online optimal control of current-fed dual active bridges based on machine learning	Ming Han, Xiaosheng Liu, Honghong Pu, Liang Zhao, Kaixuan Wang, Dianguo Xu	43
High step-up three-level DC–DC converter with three-winding coupled-inductor	Xinping Ding, Delin Zhao, Yun Liu, Kai Li, Yangyang Hao	53
Reconfigurable DDP-type transmitter coil for electric vehicle wireless charging under misaligned conditions	Feng Wen, Qiang Li, Rui Li, Ling Liu, Tao Wang, Li Liu, Tao Wu, Yuxiao Li	65
A bidirectional DC/DC converter with wide-voltage gain range and low-voltage stress for hybrid-energy storage systems in electric vehicles	Zhishuang Wang, Ping Wang, Huakun Bi, Mingjie Qiu	76
Comparative study on predictive dead-beat peak current, valley current and average current control algorithms for phase-shifted full-bridge DC/DC converters	Yu Zhang, Yiming Zhang, Xuhong Wang	87

High Power Converters

Performance study of various discontinuous PWM strategies for multilevel inverters using generalized space vector algorithm	A. Suresh Kumar, K. Sri Gowri, M. Vijaya Kumar	100
DC-link voltage balance control method considering the wide regulation range in SOR for single-phase cascaded H-bridge rectifier	Xin Wang, Chenchen Wang, Changbin Gu	109
Logic pattern-based low-frequency pulse generation technique for modified multilevel DC-link inverters	Naresh K. Pilli, Santosh K. Singh	121

Adjustable Speed Drives

Position control for sliding roof systems to reduce vibration	
.....	Jae-Pil Jeong, Dong-Hee Lee 133

Motor Drives

Observer-based load current sensorless control strategy of inverter circuit in three-phase UPS	
.....	Jiajie Chang, Lan Xiao 142
Optimization of maximum torque output in the wide speed range of a PMSM traction control system	
.....	Weiwei Zhang, Fei Xiao, Jilong Liu, Zhiqin Mai, Chaoran Li 152
Internal model control of induction motors based on extended state observer	
.....	Jing Liu, Zhonggang Yin, Cong Bai, Na Du 163
Multi-step model predictive current control of permanent-magnet synchronous motor	
.....	Yanping Xu, Yifei Sun, Yongle Hou 176

Grid and Power Quality

DSP-based implementation of improved deadbeat control for three-phase shunt active power filters	
.....	Mohamed Ferhat, Lazhar Rahmani, Badreddine Babes 188
Direct AC Voltage Control for Grid-Forming Inverters	
.....	Taufik Qoria, Chuanyue Li, Ko Oue, Francois Gruson, Frederic Colas, Xavier Guillaud 198
Improved virtual quadrature-coordinate EPLL considering input harmonics and DC offset	
.....	Dong Yin, Guizhong Wang, Fengjiang Wu, Zhizhong Guo 212
Harmonic resonance analysis and stability improvement for grid-connected inverters	
.....	Bao Xie, Lin Zhou, Tiantian Liu, Mingxuan Mao 221
Double-voltage vector-based model predictive control for three-phase grid-connected AC/DC converters	
.....	Leilei Guo, Kaixuan Zhang, Yanyan Li, Nan Jin 236
Dynamic modeling, sensitivity assessment, and design of VSC-based microgrids with composite loads	
.....	Zhuoli Zhao, Ping Yang, Nathaniel Bottrell, Loi Lei Lai, Timothy C. Green 245
Strategies of voltage controllers in delta-connected H-bridge STATCOMs	
.....	Gum Tae Son, Seung-Mook Baek 260

Energy Management Systems

Lithium-ion batteries remaining useful life prediction using Wiener process and unscented particle filter	
.....	Ranran Wang, Hailin Feng 270
Fixed-frequency phase-shift modulated PV-MPPT for LLC resonant converters	
.....	Omar Abdel-Rahim, Nehmido Alamir, Mohamed Orabi, Mohamed Ismeil 279
Lithium-ion battery state of charge and parameters joint estimation using cubature Kalman filter and particle filter	
.....	Wei Xu, Jinli Xu, Xiaofeng Yan 292
Battery-inductor-supercapacitor hybrid energy storage system for DC microgrids	
.....	Duy-Hung Dam, Hong-Hee Lee 308

Device, Modeling, and Control

Gate driver for parallel connection SiC MOSFETs with over-current protection and dynamic current balancing scheme	Yimeng Zhang, Qingwen Song, Xiaoyan Tang, Yuming Zhang	319
Machine learning approach for sorting SiC MOSFET devices for paralleling	James Opondo Abuogo, Zhibin Zhao	329