

IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS

MARCH 2021

VOLUME 68

NUMBER 3

ITIED6

(ISSN 0278-0046)

PAPERS

<i>Multi-phase systems</i>		
Effective Magnetic Component Design of Three-Phase Dual-Active-Bridge Converter for LVDC Distribution System	H.-J. Choi, B.-G. Seo, M.-H. Ryu, Y.-P. Cho, and J.-H. Jung	1828
Grid Impedance Estimation by Measuring Only the Current Injected to the Grid by a VSI With <i>LCL</i> Filter	R. A. Fantino, C. A. Busada, and J. A. Solsona	1841
Robust and Cost-Effective Synchronization Scheme for a Multicell Grid Emulator	N. Hildebrandt, M. Luo, and D. Dujic	1851
A New Modulation Scheme for a Four-Level Single Flying Capacitor Converter	J. Ebrahimi and H. Karshenas	1860
A Hybrid Three-Phase AC/DC Power System for Low-Frequency Pulsed Load Applications	J. Zhu, H. Wu, J. Chen, L. Li, M. Hua, and Y. Xing	1871
Second-Order Sliding-Mode Current Controller for <i>LC</i> -Coupling Hybrid Active Power Filter	C. Gong, W.-K. Sou, and C.-S. Lam	1883
A Hybrid Multilevel Inverter Scheme for Nine-Phase PPMIM Drive by Using Three-Phase Five-Leg Inverters	B. Prathap Reddy, M. Meraj, A. Iqbal, S. Keerthipati, and M. S. Bhaskar	1895
<i>Machines and Drives</i>		
Hybrid DC-Bus Capacitor Discharge Strategy Using Internal Windings and External Bleeder for Surface-Mounted PMSM-Based EV Powertrains in Emergency	C. Gong, Y. Hu, W. Li, J. Gao, J. Liu, H. Wen, and J. Yang	1905
A Fault-Tolerant Machine Based on Radial-Flux Dual Stator and Parallel Permanent-Magnet/Reluctance Structure	Y. Zhao, W. Huang, W. Jiang, X. Lin, and D. Dong	1916
Modeling of End-Space Convection Heat-Transfer for Internal and External Rotor PMSMs With Fractional-Slot Concentrated Windings	A. Tovar-Barranco, A. López-de-Heredia, I. Villar, and F. Briz	1928
Improved Model Predictive Current Control for SPMSM Drives Using Current Update Mechanism	X. Yuan, S. Zhang, C. Zhang, A. Galassini, G. Buticchi, and M. Degano	1938
Repetitive Control Based Phase Voltage Modulation Amendment for FOC-Based Five-Phase PMSMs Under Single-Phase Open Fault	B. Tian, L. Sun, M. Molinas, and Q.-T. An	1949
A New Torque Observation Technique for a PMSM Considering Unknown Magnetic Conditions	M. Taherzadeh, M. A. Hamida, M. Ghanes, and M. Koteich	1961
Synchronous Reluctance Motor Parameter and State Estimation Using Extended Kalman Filter and Current Derivative Measurement	Z. Mynar, P. Vaclavek, and P. Blaha	1972
Analysis and Evaluation of a Linear Primary Permanent Magnet Vernier Machine With Multiharmonics	G. Liu, H. Zhong, L. Xu, and W. Zhao	1982

(Contents Continued on Page 1825)



A PUBLICATION OF THE IEEE INDUSTRIAL ELECTRONICS SOCIETY



Cascaded Control of Back-to-Back Converter DC Link Voltage Robust to Grid Parameters Variation	M. Car, V. Lešić, and M. Vašak	1994
Real-Time Control of an IPMSM Using Model Order Reduction	M. F. Far, F. Martin, A. Belahcen, P. Rasilo, and H. A. A. Awan	2005
A Novel Piezoelectric Inchworm Actuator Driven by One Channel Direct Current Signal	R. Wang, Y. Hu, D. Shen, J. Ma, J. Li, and J. Wen	2015
Direct Torque Control Strategy for DC-Biased Vernier Reluctance Machines Capable of Zero-Sequence Current Regulation	Z. Yu, W. Kong, and R. Qu	2024
MTPA-Based Finite-Set Model Predictive Control Without Weighting Factors for Linear Induction Machine	M. F. Elmorshedy, W. Xu, S. M. Allam, J. Rodriguez, and C. Garcia	2034
Virtual-Vector-Based Robust Predictive Current Control for Dual Three-Phase PMSM	S. Liu and C. Liu	2048
Modeling and Drive Control of a Brushless Dual-Mechanical-Port Machine With Integrated Winding	X. Han, H. Fang, D. Li, W. Kong, X. Ren, Z. Liang, and R. Qu	2059
Optimized Direct Instantaneous Torque Control for SRMs With Efficiency Improvement	Q. Sun, J. Wu, and C. Gan	2072
A Novel Sizing Approach for Synchronous Reluctance Machines	M. Murataliyev, M. Degano, and M. Galea	2083
Analytical Method for Calculating the Magnetic Field of Spoke-Type Permanent Magnet Machines Accounting for Eccentric Magnetic Pole	Y. Zhou and Z. Xue	2096
Equivalent 3-Level PWM: An Improved Technique to Reduce Torque Ripple in DI-WRIM Analyzed as DI-OWIM	N. K. Bajjuri and A. K. Jain	2108
Discrete-Time SMO Sensorless Control of Current Source Converter-Fed PMSM Drives With Low Switching Frequency	L. Ding, Y. W. Li, and N. R. Zargari	2120
<i>Single-Phase Electronics</i>		
Generalized Three-Winding Switched-Coupled-Inductor Impedance Networks With Highly Flexible Gain	S. Sharifi, Y. Chulaee, H. A. Zarchi, and M. Monfared	2130
A New Kind of Balancing Circuit With Multiple Equalization Modes for Serially Connected Battery Pack	S. Wang, S. Yang, W. Yang, and Y. Wang	2142
Resilient Frequency Control Design for Microgrids Under False Data Injection	M. R. Khalghani, J. Solanki, S. K. Solanki, M. H. Khooban, and A. Sargolzaei	2151
Solar Energy-Harvesting Buck-Boost Converter With Battery-Charging and Battery-Assisted Modes	J. Park, M.-G. Jeong, J.-G. Kang, and C. Yoo	2163
Transformerless UPS System Based on the Half-Bridge Hybrid Switched-Capacitor Operating as AC-DC and DC-DC Converter	L. G. Fernandes, A. A. Badin, D. F. Cortez, R. Gules, E. F. R. Romaneli, and A. Assef	2173
An Improved Controlled-Frequency-Band Impedance Measurement Scheme for Railway Traction Power System	P. Pan, H. Hu, D. Xiao, Y. Song, and Z. He	2184
Mutual Inductance Behavioral Modeling for Wireless Power Transfer System Coils	G. Di Capua, N. Femia, K. Stoyka, G. Di Mambro, A. Maffucci, S. Ventre, and F. Villone	2196
A New Simple-Structure Passive Lossless Snubber for DC-DC Boost Converters	T. Shamsi, M. Delshad, E. Adib, and M. R. Yazdani	2207
A Current Reshaping Strategy to Reduce Parasitics-Induced Current Distortion in Discontinuous Conduction Mode Boost Power Factor Correction Converter	L. Li, Q. Zhang, R. Min, K. Liu, Q. Tong, and D. Lyu	2215
<i>Renewable Energy Systems</i>		
A Sensorless Self-Tuning Resonance System for Piezoelectric Broadband Vibration Energy Harvesting	G. Shi, Y. Xia, Y. Yang, J. Chen, Y. Peng, H. Xia, X. Wang, and L. Qian	2225
A High-Performance Global Maximum Power Point Tracker of PV System for Rapidly Changing Partial Shading Conditions	M. Kermadi, Z. Salam, J. Ahmed, and E. M. Berkouk	2236
Stability Region Based Robust Controller Design for High-Gain Boost DC-DC Converter	N. Kumar and M. Veerachary	2246
Analysis of an Active Charge Balancing Method Based on a Single Nonisolated DC/DC Converter	M. Raeber, A. Heinzelmann, and D. O. Abdeslam	2257
Recourse-Cost Constrained Robust Optimization for Microgrid Dispatch With Correlated Uncertainties	H. Qiu, H. Long, W. Gu, and G. Pan	2266

Effective Coordinated Virtual Impedance Control for Accurate Power Sharing in Islanded Microgrid	M.-D. Pham and H.-H. Lee	2279
Power Loss Prediction for Distributed Energy Resources: Rapid Loss Estimation Equation.....	M. Amyotte and M. Ordóñez	2289
Adaptive Distance Relaying for Distribution Lines Connecting Inverter-Interfaced Solar PV Plant	P. Mishra, A. K. Pradhan, and P. Bajpai	2300
A -Source Circuit Breaker for DC Microgrid Protection	Z. Zhou, J. Jiang, S. Ye, C. Liu, and D. Zhang	2310
A Decentralized SOC Balancing Method for Cascaded-Type Energy Storage Systems	G. Shi, H. Han, Y. Sun, Z. Liu, M. Zheng, and X. Hou	2321
A Novel Three-Level CLLC Resonant DC–DC Converter for Bidirectional EV Charger in DC Microgrids	Y. Xuan, X. Yang, W. Chen, T. Liu, and X. Hao	2334
<i>Robotics and Mechatronics</i>		
A Flip-Chip Alignment System With the Property of Deviation Self-Correction at the Nanoscale	S. He, H. Tang, K. Zhang, C. Chen, J. Wang, Z. Zhu, J. Gao, C. Cui, and X. Chen	2345
Adaptive Time-Delay Control for Cable-Driven Manipulators With Enhanced Nonsingular Fast Terminal Sliding Mode.....	Y. Wang, S. Li, D. Wang, F. Ju, B. Chen, and H. Wu	2356
A Novel Respiratory Follow-Up Robotic System for Thoracic-Abdominal Puncture.....	L. Zheng, H. Wu, L. Yang, Y. Lao, Q. Lin, and R. Yang	2368
Skin-Type Proximity Sensor by Using the Change of Electromagnetic Field	T. D. Nguyen, T. Kim, J. Noh, H. Phung, G. Kang, and H. R. Choi	2379
<i>Control and Signal Processing</i>		
Single-to-Balanced and Balanced-to-Balanced Dual-Channel Filters Using Multilayer Substrate Integrated Waveguide Cavities	H.-Y. Li, J.-X. Xu, and X. Y. Zhang	2389
Robust Performance in Parametric Control System Design With Application to Power Systems.....	M. Firouzbahrami and A. Nobakhti	2400
Highly Reconfigurable Dual-Band Coupler With Independently Tunable Frequency and Coupling Coefficient at the Lower Band	Y. F. Pan, S. Y. Zheng, W. Hong, and W. S. Chan	2408
Design and Implementation of Bounded Finite-Time Control Algorithm for Speed Regulation of Permanent Magnet Synchronous Motor	H. Du, G. Wen, Y. Cheng, and J. Lü	2417
Adaptive Tracking Control of Cooperative Robot Manipulators With Markovian Switched Couplings.....	B. Hu, Z.-H. Guan, F. L. Lewis, and C. L. P. Chen	2427
Area Efficient High-Performance Digitally Controlled Power Management Unit	C.-W. Liu and L.-R. Chang-Chien	2437
Adaptive-Event-Trigger-Based Fuzzy Nonlinear Lateral Dynamic Control for Autonomous Electric Vehicles Under Insecure Communication Networks	W. Li, Z. Xie, P. K. Wong, X. Mei, and J. Zhao	2447
Path Following Control of Autonomous Four-Wheel-Independent-Drive Electric Vehicles via Second-Order Sliding Mode and Nonlinear Disturbance Observer Techniques	J. Chen, Z. Shuai, H. Zhang, and W. Zhao	2460
Enhanced Switching Frequency Control in FCS-MPC for Power Converters	M. Aguirre, S. Kouro, C. A. Rojas, and S. Vazquez	2470
An Improved Hybrid Prefiltered Open-Loop Algorithm for Three-Phase Grid Synchronization	A. K. Verma, R. K. Jarial, P. Roncero-Sánchez, M. R. Ungarala, and J. M. Guerrero	2480
Synchronization in Multiple Neural Networks With Delay and Disconnected Switching Topology via Event-Triggered Impulsive Control Strategy.....	J. Chen, B. Chen, and Z. Zeng	2491
Time-Varying Formation Tracking of Uncertain Nonaffine Nonlinear Multiagent Systems With Communication Delays	Y. Yang, X. Si, D. Yue, and J. Tan	2501
<i>Diagnosis and Monitoring</i>		
Retroreflective Transceiver Array Using a Novel Calibration Method Based on Optimum Phase Searching....	H. Koo, J. Bae, W. Choi, H. Oh, H. Lim, J. Lee, C. Song, K. Lee, K. Hwang, and Y. Yang	2510
Machine Remaining Useful Life Prediction via an Attention-Based Deep Learning Approach	Z. Chen, M. Wu, R. Zhao, F. Guretno, R. Yan, and X. Li	2521
Data-Driven Approaches for Characterization of Delamination Damage in Composite Materials	H. Liu, S. Liu, Z. Liu, N. Mrad, and A. S. Milani	2532

Fault Diagnosis of Steel Wire Ropes Based on Magnetic Flux Leakage Imaging Under Strong Shaking and Strand Noises	Z. Zhou and Z. Liu	2543
Signal Enhancement Method for Mechanical Fault Diagnosis in Flexible Drive-Train	Y. Yao, B. Xie, L. Lei, Y. Li, and Q. Yin	2554
Wavelet-Based Monitor for Grid Impedance Estimation of Three-Phase Networks	D. K. Alves, R. L. de A. Ribeiro, F. B. Costa, T. de O. A. Rocha, and J. M. Guerrero	2564
Magnetic Equivalent Modeling of Stator Currents for Localized Fault Detection of Planetary Gearboxes Coupled to Electric Motors	Q. Han, T. Wang, Z. Ding, X. Xu, and F. Chu	2575
Deep Residual Networks With Adaptively Parametric Rectifier Linear Units for Fault Diagnosis	M. Zhao, S. Zhong, X. Fu, B. Tang, S. Dong, and M. Pecht	2587
Temporal-Spatio Graph Based Spectrum Analysis for Bearing Fault Detection and Diagnosis	T. Wang, Z. Liu, G. Lu, and J. Liu	2598
Comparison of Thermal Stress During Short-Circuit in Different Types of 1.2-kV SiC Transistors Based on Experiments and Simulations	D.-P. Sadik, J. Colmenares, J.-K. Lim, M. Bakowski, and H.-P. Nee	2608
Distribution-Invariant Deep Belief Network for Intelligent Fault Diagnosis of Machines Under New Working Conditions	S. Xing, Y. Lei, S. Wang, and F. Jia	2617
Key-Performance-Indicator-Related Process Monitoring Based on Improved Kernel Partial Least Squares	Y. Si, Y. Wang, and D. Zhou	2626
A Zoning-Based Secure Control Approach Against Actuator Attacks in Industrial Cyber-Physical Systems	J. Yang, C. Zhou, Y. C. Tian, and C. An	2637
Ensemble Joint Sparse Low-Rank Matrix Decomposition for Thermography Diagnosis System	J. Ahmed, B. Gao, W. L. Woo, and Y. Zhu	2648
Capacity-Fading Behavior Analysis for Early Detection of Unhealthy Li-Ion Batteries	C. Lee, S. Jo, D. Kwon, and M. G. Pecht	2659
A Simple Method to Localize and Monitor the Emissive Sources in a Converter Panel	R. Biswas and A. Routray	2667
<i>Instrumentation and Sensors</i>		
Self-Powered Carbon Nanotube Yarn for Acceleration Sensor Application	B.-J. Kim, Y. Jang, J. H. Moon, R. H. Baughman, and S. J. Kim	2676
Electromagnetic Vibrational Energy Harvester With Microfabricated Springs and Flexible Coils	Y. Li, J. Li, A. Yang, Y. Zhang, B. Jiang, and D. Qiao	2684
<i>Embedded Systems</i>		
Mobile AMOLED Display Power Model Considering $I-R$ Drop in Smartphones	S.-G. Lim, K. Lee, and Y.-J. Kim	2694
<i>Intelligent Systems</i>		
Characterization of Time Delay in Power Hardware in the Loop Setups	E. Guillo-Sansano, M. H. Syed, A. J. Roscoe, G. M. Burt, and F. Coffele	2703
Efficient Hybrid Central Processing Unit/ Input–Output Resource Scheduling for Virtual Machines	D. Wang, W. Zhang, H. He, and Y.-C. Tian	2714
Dynamic and Stability Analysis of the Power System With the Control Loop of Inverter Air Conditioners	H. Hui, Y. Ding, T. Chen, S. Rahman, and Y. Song	2725
