

2017 International Symposium on Power Electronics (Ee 2017)

**Novi Sad, Serbia
19-21 October 2017**



**IEEE Catalog Number: CFP17J55-POD
ISBN: 978-1-5386-3503-2**

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP17J55-POD
ISBN (Print-On-Demand):	978-1-5386-3503-2
ISBN (Online):	978-1-5386-3502-5

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

Table of Contents

IP		INVITED PAPERS
IP1-1 Chandra Mouli Gautham Ram Venugopal Prasanth Bauer Pavol	Netherlands Netherlands Netherlands	FUTURE OF ELECTRIC VEHICLE CHARGING 1
IP1-2 Blaabjerg Frede Zhou Dao Sangwongwanich Ariya Wang Huai	Denmark Denmark Denmark Denmark	DESIGN FOR RELIABILITY IN RENEWABLE ENERGY SYSTEMS 8
IP1-3 Boldea Ion Popa (Moldovan) Ana Tutelea Lucian	Romania Romania Romania	LARGE WIND GENERATORS DESIGN, PERFORMANCE AND CONTROL: AN OVERVIEW 14

T1.1		POWER CONVERTERS AND DEVICES
T1.1-1 Abojlala Khaled Holliday Derrick Xu Lie	United Kingdom United Kingdom United Kingdom	STABILITY NORMS CONTROL USING THE VIRTUAL IMPEDANCE CONCEPT FOR POWER FREQUENCY APPLICATIONS 22
T1.1-2 Chen Xiyu Chen Jianhui Li Guanlin Mu Xianmin Qi Chen	China China China China China	ELECTRIC-FIELD-COUPLED SINGLE-WIRE POWER TRANSMISSION — ANALYTICAL MODEL AND EXPERIMENTAL DEMONSTRATION 28
T1.1-3 Jovcic Dragan Lin Weixing Nguefeu Samuel Saad Hani	United Kingdom United Kingdom France France	FULL BRIDGE MMC CONVERTER CONTROLLER FOR HVDC OPERATION IN NORMAL AND DC FAULT CONDITIONS 34
T1.1-4 Bašić Mateo Vukadinović Dinko Polić Miljenko	Croatia Croatia Croatia	DYNAMIC SIMULATION MODEL OF A QUASI-Z- SOURCE INVERTER WITH PARASITIC RESISTANCES AND SATURABLE INDUCTOR 40



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T1.1-5 Banzhaf Stephanie Kennthner Johannes Grieb Michael Schwaiger Stephan Erlbacher Tobias Bauer Anton Frey Lothar	Germany Germany Germany Germany Germany Germany Germany	STRESS REDUCTION IN HIGH VOLTAGE MIS CAPACITOR FABRICATION 46
T1.1-6 Zaja Mario Jovcic Dragan Hajian Masood	United Kingdom United Kingdom United Kingdom	DC BUS STRENGTH IN DC GRID PROTECTION 52
T1.1-7 Coulinge Emilien Burnet Jean-Paul Dujic Drazen	Switzerland Switzerland Switzerland	HIGH-CURRENT LOW-VOLTAGE POWER SUPPLIES FOR SUPERCONDUCTING MAGNETS 58
T1.1-8 Arif Muhammad Saleem Jawad Abbas Qamar Todorovic Ivan Majid Abdul	Pakistan Pakistan Pakistan Serbia Pakistan	HIGH GAIN BIDIRECTIONAL MULTIPOINT DC TO DC CONVERTER FOR DC MICROGRID 64

T1.2		POWER CONVERTERS AND DEVICES
T1.2-1 Pop-Călimanu Ioana- Monica Renken Folker Lascu Dan Lica Septimiu Gurbina Mircea	Romania Germany Romania Romania Romania	A NEW HYBRID BOOST-L CONVERTER 70
T1.2-2 Pajnić Milan Pejović Predrag Despotović Željko Lazić Miroslav Skender Miodrag	Serbia Serbia Serbia Serbia Serbia	DESIGN CONSIDERATION FOR HIGH FREQUENCY LLC RESONANT CONVERTER WITH MATRIX TRANSFORMER 76
T1.2-3 Pajnić Milan Pejović Predrag Despotović Željko Lazić Miroslav Skender Miodrag	Serbia Serbia Serbia Serbia Serbia	CHARACTERIZATION AND GATE DRIVE DESIGN OF HIGH VOLTAGE CASCODE GAN HEMT 82
T1.2-4 Prodanov Prodan Dankov Dobroslav	Bulgaria Bulgaria	RELIABILITY OF POWER SUPPLIES FOR INDUCTION HEATING THROUGH AN ANALYSIS OF THE STATES IN OPERATING MODES 87
T1.2-5 Unlu Murat Çamur Sabri Beşer Ersoy Arifoğlu Birol	Turkey Turkey Turkey Turkey	A MODIFIED LINE-COMMUTATED INVERTER FOR GRID-CONNECTED PHOTOVOLTAIC SYSTEMS WITH VOLTAGE-BASED MAXIMUM POWER POINT TRACKING METHOD 93



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T2.1		AUTOMOTIVE AND INDUSTRIAL DRIVES
T2.1-1 Pózna Anna Magyar Attila Hangos Katalin	Hungary Hungary Hungary	MODEL IDENTIFICATION AND PARAMETER ESTIMATION OF LITHIUM ION BATTERIES FOR DIAGNOSTIC PURPOSES 99
T2.1-2 Milosavljević Čedomir Peruničić Branislava Petronijević Milutin Veselić Boban	Bosnia and Herzegovina Bosnia and Herzegovina Serbia Serbia	A NEW DISCRETE-TIME SUPER TWISTING CONTROL OF A FIRST ORDER PLANT WITH INPUT SATURATION 105
T2.1-3 Bruzzese Claudio Ruggeri Enrico Rafiei Mohamed Zito Damiano Santini Ezio Mazzuca Teresa Lipardi Gennaro	Italy Italy Italy Italy Italy Italy Italy	MECHANICAL ARRANGEMENTS ONBOARD SHIP OF INNOVATIVE PERMANENT MAGNET LINEAR ACTUATORS FOR STEERING GEAR 111
T2.1-4 Anuchin Alecksey Lashkevich Maxim Aliamkin Dmitry Briz Fernando	Russian Federation Russian Federation Russian Federation Spain	ACHIEVING MAXIMUM TORQUE FOR SWITCHED RELUCTANCE MOTOR DRIVE OVER ITS ENTIRE SPEED RANGE 117
T2.1-5 Rios GarciaNatalia Gonzalez Prietolgnacio Duran MartinezMario J. Barrero GarciaFederico	Spain Spain Spain Spain	RESISTANCE DISSYMMETRY LOCALIZATION METHOD BASED ON VECTOR SPACE DECOMPOSITION APPROACH FOR SIX-PHASE INDUCTION MACHINES 123

T3.1		ELECTRICAL MACHINES
T3.1-1 Zabaleta Mikel Levi Emil Jones Martin	Spain United Kingdom United Kingdom	DUAL THREE-PHASE PM GENERATOR PARAMETER IDENTIFICATION USING EXPERIMENTAL AND SIMULATED SYSTEM RESPONSES 129
T3.1-2 Zaskalicky Pavel	Slovakia	TORQUE RIPPLE CALCULATION OF TWO-PHASE IM SUPPLIED BY THREE-LEG VSI WITH PWM OUTPUT VOLTAGE CONTROL 135
T3.1-3 Popadic Bane Vasic Veran Dumnic Boris Milicevic Dragan Vukajlovic Nikola	Serbia Serbia Serbia Serbia Serbia	ROTOR SLOT HARMONICS BASED INDUCTION MACHINE SPEED ESTIMATION 141
T3.1-4 Dinulovic Dragan Shousha Mahmoud Brooks Michael Haug Martin Petrovic Tomislav	Germany Germany Germany Germany Serbia	PORTABLE ROTATIONAL ELECTROMAGNETIC ENERGY HARVESTER WITH A MAXIMUM ENERGY TRACKING POWER MANAGEMENT SYSTEM 147



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T3.1-5 Zoric Ivan Jones Martin Levi Emil	United Kingdom United Kingdom United Kingdom	VECTOR SPACE DECOMPOSITION ALGORITHM FOR ASYMMETRICAL MULTIPHASE MACHINES 153
T3.1-6 Popovic Vladimir Oros Djura Matic Petar Marcetic Darko	Serbia Serbia Bosnia and Herzegovina Serbia	CONVERGENCE AND STABILITY ANALYSIS OF IM ROTOR TIME CONSTANT ESTIMATORS BASED ON MRAS SCHEME 159

T4.1		CONTROL AND MEASUREMENT
T4.1-1 Weiss George Natarajan Vivek	Israel India	MODIFICATIONS TO THE SYNCHRONVERTER ALGORITHM TO IMPROVE ITS STABILITY AND PERFORMANCE 165
T4.1-2 Nekoui Mohammad Ali Pakzad Mohammadali Pakzad Sara	Iran Iran Iran	OPTIMAL FRACTIONAL ORDER PID CONTROLLERS DESIGN BASED ON GENETIC ALGORITHM FOR TIME DELAY SYSTEMS 171
T4.1-3 Rivera Marco Nikolic Aleksandar Tarisciotti Luca Wheeler Pat	Chile Serbia United Kingdom United Kingdom	INDIRECT MODEL PREDICTIVE CONTROL STRATEGIES WITH INPUT FILTER RESONANCE MITIGATION FOR A MATRIX CONVERTER OPERATING AT FIXED SWITCHING FREQUENCY 177
T4.1-4 Freijedo Francisco D. Javaid Uzair Dujic Drzen	Switzerland Switzerland Switzerland	CONFORMAL MAPPING OF IMPEDANCE STABILITY MODELS FOR SYSTEM-LEVEL DYNAMICS ASSESSMENTS 183
T4.1-5 Lale Srđan Šoja Milomir Lubura Slobodan	Bosnia and Herzegovina Bosnia and Herzegovina Bosnia and Herzegovina	UNIPOLAR SWITCHED BIDIRECTIONAL BRIDGELESS POWER FACTOR CORRECTION BOOST RECTIFIER WITH ADAPTIVE DUAL CURRENT MODE CONTROL 189
T4.1-6 Lin Jun Weiss George	Israel Israel	PLUG-AND-PLAY REALIZATION OF THE VIRTUAL INFINITE CAPACITOR 195
T4.1-7 Bálint Roland Hangos Katalin M. Magyar Attila	Hungary Hungary Hungary	OPTIMAL SCHEDULING OF A HOUSEHOLD REFRIGERATOR USING ADAPTIVE MODEL PREDICTIVE TECHNIQUE 201
T4.1-8 Markou Achilleas Palaogiannis Foivos Soldatos Argiris Hatzigiorgiou Nikos	Greece Greece Greece Greece	EXPERIMENTAL VALIDATION OF A NON-LINEAR ROBUST CONTROLLER FOR DC-DC BOOST CONVERTERS 207



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T4.2		CONTROL AND MEASUREMENT
T4.2-1 Anuchin Alecksey Astakhova Valentina Shpak Dmitry Zharkov Alexandr Briz Fernando	Russian Federation Russian Federation Russian Federation Russian Federation Spain	OPTIMIZED METHOD FOR SPEED ESTIMATION USING INCREMENTAL ENCODER 213
T4.2-2 Lubura Slobodan Ristovic Krstic Milica Lale Srdjan Soja Milomir Milosavljevic Cedomir	Bosnia and Herzegovina Bosnia and Herzegovina Bosnia and Herzegovina Bosnia and Herzegovina Bosnia and Herzegovina	ANALYSIS OF DISCRETE VS-PLL STRUCTURE USED FOR GRID PARAMETERS ESTIMATION 218
T4.2-3 Rodriguez-Diaz Enrique Vasquez Juan C. Guerrero Josep M. Freijedo Francisco D.	Denmark Denmark Denmark Switzerland	IMPEDANCE STABILITY ASSESSMENT OF ACTIVE DAMPING STRATEGIES FOR LCL GRID- CONNECTED CONVERTERS 223
T4.2-4 Zeljković Čedomir Mršić Predrag	Bosnia and Herzegovina Bosnia and Herzegovina	FAST AND EFFICIENT PLACEMENT OF FAULT INDICATORS BASED ON THE PATTERN SEARCH ALGORITHM 228

T4.3		CONTROL AND MEASUREMENT
T4.3-1 Kušljević Miodrag Tomić Josif Poljak Predrag	Serbia Serbia Serbia	GROUP-DELAY-CONTROLLED MULTIPLE- RESONATOR-BASED HARMONIC ANALYSIS 234
T4.3-2 Naumovic Vukovic Dragana Skundric Slobodan Zigic Aleksandar	Serbia Serbia Serbia	THREE CHANNELS DEVICE FOR CURRENT TRANSFORMERS ACCURACY TESTING 240
T4.3-3 Lin Jun Weiss George	Israel Israel	MULTILEVEL CONVERTER WITH VARIABLE FLYING CAPACITOR VOLTAGE USED FOR VIRTUAL INFINITE CAPACITOR 244
T4.3-4 Veinovic Slavko Stojic Djordje Joksimovic Dusan Klasnic Ilija	Serbia Serbia Serbia Serbia	CONTROL OF ROTARY EXCITER WITH SERIES AND SEPARATELY EXCITATION WINDINGS 250



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T6.1		POWER QUALITY
T6.1-1 Petrovic Predrag	Serbia	POWER HARMONICS ESTIMATION BASED ON ANALYTICAL SIGNAL CONCEPT 255
T6.1-2 B�y�k Mehmet Tan Adnan �nci Mustafa T�may Mehmet	Turkey Turkey Turkey Turkey	A NOTCH FILTER BASED ACTIVE DAMPING OF LLCL FILTER IN SHUNT ACTIVE POWER FILTER 261
T6.1-3 Mitrovi� Vladimir Mijalkovi� Milan	Serbia Serbia	POWER QUALITY DATA LOGGER WITH INTERNET ACCESS 266
T6.1-4 Stanisavljevi� Aleksandar Kati� Vladimir Dumni� Boris Popadi� Bane	Serbia Serbia Serbia Serbia	OVERVIEW OF VOLTAGE DIPS DETECTION ANALYSIS METHODS 272
T6.1-5 Laketi� Nikola Radakovi� Jovan Majtal Zoltan	Serbia Serbia Serbia	POWER FACTOR CORRECTION OF ELECTRIC ARC FURNACE USING ACTIVE AND PASSIVE COMPENSATION 278

T7.1		RENEWABLE & DISTRIBUTED ENERGY SOURCES (RES)
T7.1-1 Papageorgiou Panos Alexandridis Antonio	Greece Greece	STABILIZING THE VSI RESPONSE IN MICROGRIDS VIA NOVEL PI CONTROLLERS 284
T7.1-2 �orba Zoltan Popadi� Bane Kati� Vladimir Dumni� Boris Mili�evi� Dragan	Serbia Serbia Serbia Serbia Serbia	FUTURE OF HIGH POWER PV PLANTS – 1500V INVERTERS 290
T7.1-3 Veki� Marko Porobi� Vlado Grabi� Stevan Ad�i� Evgenije Zogogianni Charoula	Serbia Serbia Serbia Serbia Greece	EXPLICIT ACTIVE POWER REFERENCE TRACKING ALGORITHM FOR PHOTOVOLTAIC CONVERTER 295
T7.1-4 Porobic Vlado Adzic Evgenije Grabic Stevan Vekic Marko Rapaic Milan	Serbia Serbia Serbia Serbia Serbia	PRECISE PV ACTIVE POWER - CONVERTER CONTROL RAPID PROTOTYPING FRAMEWORK 301



19th INTERNATIONAL SYMPOSIUM on POWER ELECTRONICS - Ee 2017

NOVI SAD, SERBIA, October 19th - 21th, 2017

T7.2		RENEWABLE & DISTRIBUTED ENERGY SOURCES (RES)
T7.2-1 Gadjeva Elissaveta Hristov Marin	Bulgaria Bulgaria	COMPUTER-AIDED MODEL PARAMETER EXTRACTION OF PHOTOVOLTAIC MODULES USING SPICE 307
T7.2-2 Majstorović Milovan R. Despotović Željko Ristić Leposava	Serbia Serbia Serbia	APPLICATION OF MOBILE SOLAR OFF-GRID GENERATOR IN IRRIGATION SYSTEM - CASE STUDY 312
T7.2-3 Savić Nemanja Katić Vladimir Miličević Dragan Dumnić Boris Katić Nenad	Serbia Serbia Serbia Serbia Serbia	TECHNO-ECONOMIC ANALYSIS OF ROOFTOP PV POWER PLANTS IN THE REPUBLIC OF SERBIA 318
T7.2-4 Dumnić Boris Vukajlović Nikola Vujkov Barbara Adžić Evgenije Popadić Bane Miličević Dragan Katić Vladimir Corba Zoltan Jerkan Dejan Dragić Mile Hofman Milan	Serbia Serbia Serbia Serbia Serbia Serbia Serbia Serbia Slovenia Serbia	CONTROL OF ELECTRICAL GENERATOR USED IN SIGMA WAVE ENERGY CONVERSION SYSTEM 318