European Association for the Development of Renewable Energy, Environment and Power Quality

ICREPQ'19

INTERNATIONAL CONFERENCE ON RENEWABLE ENERGIES AND POWER QUALITY

Tenerife, 10–12 of April 2019

PROGRAM OF ACTIVITIES

ON RENEWABLE ENERGY AND POWER QUALITY

(ICREPQ'19)

WELCOME TO ICREPQ'19

On behalf of the Steering Committee and the Local Organizing Committee we want to give you a very warm welcome to ICREPQ'19 and to Tenerife

Our International Programme Committee has selected a high quality 130 papers (among 180 proposals) from which 106 will be presented at the Conference, 40 at oral sessions and 66 at poster sessions (dialogue), during the three days of the conference. All of these papers are included in the final program. Also four keynotes will be presented in plenary sessions and also one Panel Session.

ICREPQ'19 covers the whole range of problems and solutions especially concerning with renewable energies and power quality and all the papers have direct relationship with these two fields of research and practical work.

We would like to thank all the authors, session chairmen, participants without papers and the International Scientific Committee members who have made important contributions by reviewing the proposals.

In addition to the technical sessions, a number of social events have been arranged. On Wednesday evening, April 10th, at about 17:00 H, we'll can enjoy the **Welcome Civic Reception** with one concert of the "Asociacion Folklórica Universitaria" in the Aula Magna (Room A), and after that one aperitif "Spanish Wine". On Thursday, April 11th, 20:00 H, the **Conference Dinner in La Laguna - Gran Hotel,** C/ Nava y Grimón 18, San Cristóbal de La Laguna**,** where we´ll can enjoy of a fantastic concert by the quartet of Josele del Pino, a very famous local "timplista" with a lot of international concerts. On Friday, April 12th, after the Farewell Lunch (15:00 H), we'll enjoy of the cultural visit to San Cristobal de La Laguna, World Heritage City .

We hope that you will find the conference intellectually stimulating and that you will make many fruitful personal contacts during the conference.

Best regards,

Prof. Manuel Pérez-Donsión
Chairman of the Steering Committee

Prof. Benjamín J. González Díaz
Chairman of the Local Committee

ORGANISED BY:

The International Conference on Renewable Energies and Power Quality (ICREPQ'19), will be organized by:

- European Association for the Development of Renewable Energy, Environment and Power Quality (EA4EPQ)
- University of Vigo
- University of La Laguna

CONFERENCE LANGUAGE

The Conference language is English. All papers and presentations should be made in English.

OBJECTIVES AND TOPICS

The intention of the organisers is to give an opportunity to academics, scientists, engineers, manufacturers and users from all over the world to come together in a pleasant location to discuss recent development in the areas of Renewable Energy and Power Quality.

The International Conference on Renewable Energy and Power Quality (ICREPQ´19) is structured in:

- **Plenary Sessions:** Presentations of 45 minutes in one room for all the participants
- **Oral Sessions:** Presentations of about 15 minutes for each paper (12 minutes for the presentation and 3 minutes for questions). Simultaneously in two rooms.
- **Posters Sessions:** In 45-minute periods during the coffee breaks.
- **Panel Session:** In 120 minutes. 90 minutes for the presentation and 30 minutes for question

SOCIAL EVENTS

- **Civic Reception: 10th of April**
- **Conference Dinner: 11th of April**

VENUE

The International Conference on Renewable Energies and Power Quality(ICREPQ'19) will be held at the University of La Laguna. Campus of Guajara. Tenerife. Spain.

1. RENEWABLE ENERGY:

- Wind Energy, Small Hydro Energy, Solar Energy, Photovoltaic Energy, Ocean Energy, Geothermal, Biomass, Cogeneration,…
- Classical and special electrical generators: Theory, design, analysis, losses, efficiency, heating and cooling, vibration and noise, modelling and simulation, control strategies, protection systems, maintenance, mechanical behaviour, new methods of testing, parallel operation, transmission system, stability,...
- Power plants. Distributed generation. Fuel cells. Co-generation. Hybrid Systems. Microgrids. Smart grids. Original solutions,...
- Energy conversion, conservation and energy efficiency.
- Energy saving policy. Energy storage. Batteries....
- Energy and the environment. Ecological balance. Ecosystem,...
- Application of the renewable energy. Best practice projects.
- Legislation in the area of renewable energies.
- Biomass combustion techniques. The energy use of agricultural and forest residues. Production and the energy exploitation of bio-gas. Environment. Social importance…
- Interconnection and transport problems.
- Planning and control of the power system take into account the renewable energy. Stability. Protection…
- Economic analysis of the power system take into account the renewable energy.
- Electricity Market Structures. Regulation/des-regulation of the power market. Influence of the renewable energy.
- Models and simulation of the power systems. Models and estimation of loads. Software tools.
- Application of the communications, internet, artificial intelligence for the renewable energy.
- Security assessment and risk analysis in renewable energy.
- Electric vehicles.
- Electrical Machines & Drives, Power electronics and Control strategies for renewable energy applications.
- Monitoring and Diagnostics of electrical machines & drives, Tools for Diagnostics, Test for Predictive Maintenance in Renewable…
- Sensors and actuators for renewable energy applications.
- Renewable Energies Teaching.

2. POWER QUALITY:

- Electromagnetic compatibility (EMC).
- Power Quality in Transport and Distribution. FACTS
- Economic Studies of the Power Quality.
- Low-frequency conducted disturbances: Voltage deviations, voltage fluctuations-flicker,voltage dips and short interruptions, harmonics and inter-harmonics, transient over-voltages, voltage unbalance (imbalance), temporary power-frequency variations.
- Sources, effects and mitigation methods of the disturbances.
- Measurements of the power quality in networks, industrial installations and Laboratories. Equipment, procedures and measurement methods. Standards.
- Modelling and simulation of the power quality. Software tools.
- Transmission of the disturbances.
- Filtering techniques.
- Power factor compensation. Capacitor switching techniques.
- Optimization techniques.

- Communication, internet and artificial intelligence.
- Permanent monitoring techniques and online diagnosis.
- Intelligent energy delivery systems. Uninterrupted power supplies.
- Expert systems applications.
- Devices, equipment and power systems. Control centres.
- Specific problems and studies cases.
- Power quality influence in deregulated markets.
- High frequency disturbances (radiated).
- Data security and electromagnetic pulses.
- Protection against natural and intentional EMI.

SPONSORSHIP

Sincere thanks are expressed to the organisations listed below who have given valuable support to ICREPQ'19:

- EA4EPQ
- University of La Laguna
- University of Vigo
- AEDIE
- CIRCUTOR

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Issaadi, Wassila (Argeria)
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Kádár, Péter (Hungary)
Kiss, Péter (Hungary)
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Vitale, Gianpaolo (Italy)
Vokony, István (Hungary)
Xinzi Tang (China)
Youssef Errami (Morocco)
Zobaa Ahmed (UK)

ICREPQ'19 SCHEDULE

Tuesday March 9, 2019	
17:00 – 19:00	**Registration "ICREPQ'19 Secretariat"** Registration and Documentation. It's important that all the participants seize their documentation during this day, but the ICREPQ'19 Secretariat will be open during the three days of the conference, then if you don't arrive to Tenerife on Tuesday 9th, or before, you can get your documentation other day.

Wednesday April 10, 2019						
9:00 – 12:00	**Registration "ICREPQ'19 Secretariat"**					
9:30 – 10:15	**Opening Ceremony ROOM A *"Universidad de La Laguna"***					
10:15 - 11:00	**ROOM A *"U. de La Laguna"* Plenary Sessions PL1**					
	PL1	***"Battery storage operation for the sake of power system control"*** **Dr. Péter Kádár**, Professor at Óbuda University, Budapest, Hungary				
	EXTRA TIME FOR DISCUSSION					
11:00 – 11:45	**Posters Session at ROOM C *"AEDIE"* (Session P1) Coffee Break**	*Poster Session **P1***				
		200	202	207	208	212
		215	216	223	226	229
		230	233	237	238	240
		242	315			
11:45 – 13:00	**ROOM A *"U. de La Laguna"***			**ROOM B *"CIRCUTOR"***		
	*Oral Session **A1***			*Oral Session **B1***		
	220	274	296	304	320	338
	344	355		343	347	
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
13:00 -- 15:00	**Welcome Lunch** - Cafeteria					
15:00 – 17:00	**ROOM B *"CIRCUTOR"*** **Panel Session** ***"Emerging Power Quality Challenges due to the Increasing Share of Modern Power Electronics"*** **Dr. Mark Halpin** Department of Electrical & Computer Engineering. Auburn University, AL. USA **Dr. Ing. Jan Meyer** Institute of Electrical Power Systems and High Voltage Engineering. Technische Universitaet Dresden. Germany EXTRA TIME FOR DISCUSSION					
17:00 -- 19:00	**Welcome Civic Reception** **FOLKLORE UNIVERSITY ASSOCIATION** - Room A **Spanish Wine** - Cafeteria					

Thursday April 11, 2019

9:00 – 12:00	**Registration "ICREPQ'19 Secretariat"**					
9:30– 10:15	**ROOM A *"U. de La Laguna"* Plenary Sessions PL2 & PL3**					
	PL2: "*Challenges and opportunities of large-scale Power Quality monitoring*". Dr. Ing. Jan Meyer. Institute of Electrical Power Systems and High Voltage Engineering. Technische Universitaet Dresden. Germany					
10:15 – 11:00	**PL3: "*Proposed Modifications to the IEC 61000-3-X Series for Disturbance Limit Allocations for Installations*". Dr. Mark Halpin** Department of Electrical & Computer Engineering. Auburn University, AL. USA					
	EXTRA TIME FOR DISCUSSION					
11:00– 11:45	**Poster Session at ROOM C *"AEDIE"* (Session P2) Coffee Break**	*Poster Session **P2***				
		218	243	244	250	251
		253	256	260	261	263
		268	275	276	278	279
		280	282			
11:45 – 13:00	**ROOM A *"U. de La Laguna"***			**ROOM B *"CIRCUTOR"***		
	*Oral Session **A2***			*Oral Session **B2***		
	232	236	293	210	224	249
	313	314		312	325	
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
13:00 – 15:00	**Lunch** - Cafeteria					
15:00 --16:15	**ROOM A *"U. de La Laguna"***			**ROOM B *"CIRCUTOR"***		
	*Oral Session **A3***			*Oral Session **B3***		
	258	270	309	205	257	332
	376	381		357	362	
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
16:15 – 17:00	**Poster Session at ROOM C *"AEDIE"* (Session P3) Coffee Break**	*Poster Session **P3***				
			288	290	292	295
		299	300	302	310	318
		319	323	326	329	333
		336	337	379		
20:00 - 23:00	**Conference Dinner** (Optional) **La Laguna Gran Hotel** *C/* Nava y Grimón 18, San Cristóbal de La Laguna					

ROOMS: Room A: "*U. de La Laguna*" (Aula Magna). Room B: "*CIRCUTOR*"(Salón de Grados) Room C: "*AEDIE*" (Hall Aula Magna).

Friday April 12, 2019						
9:00 – 12:30	**Registration "ICREPQ'19 Secretariat"**					
9:30 - 10:15	**ROOM A *"U. de La Laguna"***					
	PL4. Electrical Energy Storage - The Future Roles and Challenges. **Dr. Ahmed F. Zobaa**. Brunel University London, U.K.					
	EXTRA TIME FOR DISCUSSION					
10:15 -- 11:00	**Poster Session at ROOM C *"AEDIE"* (Session P4) Coffee Break**	*Poster Session **P4***				
			246	283	285	345
		348	349	352	359	360
		366	368	370	372	375
		377				
11:00 – 12:15	**ROOM A *"U. de La Laguna"***			**ROOM B *"CIRCUTOR"***		
	*Oral Session **A4***			*Oral Session **B4***		
	203	272	286	254	322	341
	307	353		363	380	
	EXTRA TIME FOR DISCUSSION			**EXTRA TIME FOR DISCUSSION**		
12:15– 13:00	**ROOM A*"U. de La Laguna"* CLOSING SESSION**					
	Conclusions and time for the next conference (ICREPQ'20)					
	Awards for the three best posters					
13:00 – 15:00	**Farewell Lunch** - Cafeteria					
15:00 – 20:00	**Excursion for to visit to San Cristobal de La Laguna** **Cultural Property Heritage of the Humanity** by UNESCO-1999 The first model of colonial not strengthened city					

SPECIAL SESSIONS SELECTED FOR ICREPQ'19		
No.	**TITLE**	**CHAIRMEN**
1	Control and integration of wind energy systems	M.J. Duran Martínez and M. A. H. El-Sayed
2	Microgrids and Smart grids	G. B. Gharehpetian and Alfredo Vaccaro
3	Electric vehicles	Pere Andrada
4	Solar Technologies	Silvano Vergura and Gianpaolo Vitale
5	Applications of Multi-Level Converters and Inverters in Power Quality Improvement	P. N. Tekwani
6	Sustainable Energy Mix	Mohamed A.H. El-Sayed
7	Wind Turbines of the Future: Economics, Design & Operation	Hashem Oraee
8	Harmonics and Power Quality	András Dán and Dávid Raisz
9	Ecodesign, regulation standards and efficiency improvement of electric motors	Ramón Bargalló
10	Ocean Energy (Wave, tidal and offshore wind)	Ahmed Zobaa
11	Power Electronics for Renewable Energy Systems	Silvano Vergura and Gianpaolo Vitale
12	Net Zero Energy Building	Antonio Gagliano and Francesco Nocera
13	Economic, Financial and Social aspects of Renewable Energy Penetration	Mihail Predescu
14	Nanotechnology for Renewable Energy	Basma El Zein and Elhadj Dogheche
15	Low & High Temperature Fuel Cells	Etim Ubong
16	Power Quality and Renewable Energy	André Martinez and Shahrokh Saadate
17	Renewable energies for developing countries	Vít Brslica and Alfredo Vaccaro
18	Strategic Energy Planning	Roberto Cesar Betini and Emilio Torrente
19	Model Predictive Control for Power Electronics Converters Dedicated to Renewable Energies systems	Kouzou Abdellah
20	Impacts of renewable energy for industrial development and sustainable economics	Amine Boudghene Stambouli and Samir Flazi
21	FACT (SVC, STATCOM, UPFC, HVDC...)	Manuel Pérez Donsión

AUTHORS

Oral Presentations

Each speaker of an oral presentation has an available time of 15 minutes (12 minutes for the presentation and 3 minutes for questions) and must be in the session room 10 minutes before of the beginning of the session for to test the audiovisual equipment and for to exchange opinions with the Session Chairman. We suggest that the speakers of one oral presentation prepare their material in Power Point.

Poster Presentations

The posters must be numbered, on the up left corner, with the number of the paper and it will be put, about 15 minutes before of the beginning of the session, on the pin board that you previously can chose and it must be take off 15 minutes after of the end of the session. The author(s) must be stay near the poster during the 45 minutes of the session duration for to answer all the questions that the audience or the chairmen could formulate. The maximum available surface for each poster will be **1000 mm x 2000 mm** (width x high). You must select your poster size take into account this maximum available surface (Perhaps an A0 size, **841×1189** mm (width x high), could be appropriate). Put on the pin board separated sheets of the paper are not allowed.

SESSION CHAIRMEN

On behalf of the International Scientific Committee, Steering Committee and the Organising Committee of the ICREPQ'19 and take into account their eminent position in the world of science we have selected 29 session chairmen. It is an honour for us their collaboration for to chair the sessions of ICREPQ'19 and their contribution would be greatly appreciated. We wish to express our warmest thanks.

Traditionally the Chairmen of each Session are independent in organising the Session. Nevertheless it is of special importance that the different session chairmen prepare some questions about the papers of their session in order to get a more dynamic one. Furthermore we expect of the session chairmen the following:

Plenary sessions

Each plenary session should not exceed **45 minutes** including presentation and discussion, (35 minutes for presentation and 10 minutes for questions).

Oral sessions

Each oral paper presentation should not exceed 15 minutes including presentation and discussion, (12 minutes for presentation and 3 minutes for questions).

Poster sessions

The author(s) of a poster presentation must be stay near to their poster during the 45 minutes of the session duration and in order to get a more dynamic session it is important that along this period of time each of the chairmen of the poster sessions formulate questions to the authors and check that all is OK. The chairmen of each of the poster sessions file up one sheet, with punctuations for each of the presented poster in that session and then, take into account these evaluations, the Organizers will deliver during the Closing Session one silver plate and one diploma to the three best posters selected.

RE&PQJ

All the papers presented in the conference will be included in the "***Renewable Energy and Power Quality Journal (RE&PQJ)***" with **ISSN: 2172-038X** and the **CrosRef DOI** that will have the format: **http://dx.doi.org/10.24084/repqj16.200.** The **RE&PQJ** was accepted by **SCOPUS** for the indexing process.

Chairmen Session distribution

Wednesday 10th April, 2019		
HOUR	**SESSION**	**CHAIRMEN**
10:15 - 11:00	PLENARY SESSION PL1	Ahmad Pourmovahed
11:00 - 11:45	POSTER SESSION P1	José Ignacio San Martín Díaz
		Cees Keller
		Baptiste Genet
		José Roberto Camacho
11:45 - 13:00	ORAL SESSION A1	Reinaldo Castro Souza
	ORAL SESSION B1	José Francisco Gómez González
13:00 - 15:00	Welcome Lunch	
15:00 - 17:00	PANEL SESSION	Mircea Ion Buzdugan
Thursday 11th April, 2019		
9:30 - 10:15	PLENARY SESSION PL2	Inmaculada Zamora Belver
10:15 - 11:00	PLENARY SESSION PL3	Gianpaolo Vitale
11:00 - 11:45	POSTER SESSION P2	José Fernández Ramos
		Sebastien Jacques
		Daniel Herbst
		Antonio Jesús López Martín
11:45 - 13:00	ORAL SESSION A2	Rudolf Mecke
	ORAL SESSION B2	Milan Belik
13:00 - 15:00	Lunch	
15:00 - 16:15	ORAL SESSION A3	Ewen Constant
	ORAL SESSION B3	Mohamed El Sayed
16:15 - 17:00	POSTER SESSION P3	José Ramón González Castro
		Thiago Mota Soares
		Karel Máslo
		Ángel Bayod Rújula
Friday 12th April, 2019		
9:30 - 10:15	PLENARY SESSION PL4	Gorazd Štumberger
10:15 - 11:00	POSTER SESSION P4	Enrique Alameda Hernández
		Mario Vrazic
		António Velho Roque
		Victoria Abad San Martín
11:00 - 12:15	ORAL SESSION A4	Pablo Eguía López
	ORAL SESSION B4	Wolf-Gerrit Frü
12:15 - 13:00	CLOSING SESSION Best poster awards Time for present ICREPQ'20	
13:00 - 15:00	Farewell Lunch	

NOTE: In some cases the Chairman of one Oral Session need to present his own paper in that session, then we suggest that first he present his paper and after that he will chair the other papers that will be presented in the session.

ICREPQ'19 KEYNOTES

PL1. *"Battery storage operation for the sake of power system control".* Dr. Péter Kádár, Professor at Óbuda University, Budapest, Hungary

The application of the batteries only for the power system scale stationary energy storage is not the best investment. The power electronics combined smartly controllable storage units has more benefits in the power system operation. In the last years spread over the small household kW scale, the Plug-in Hybrid Electric Vehicles (PHEV) and the medium size MW scale battery storage facilities. The operation of these tools affect differently the power systems. The main role of the household devices is to store the daytime generated PV energy and pass back it in the early night hours. It is a rough change in the customers daily demand profile and affects the global load curve too. The PHEV-s have mainly security storage role. In case of smaller system disturbance the thousands of the EV-s can feed back to the (low voltage) power system some energy that can ease the power system level power lack. The medium size battery banks can serve as primary source for the load-frequency control, but also can form reserve for the secondary control in the large power systems but in the smaller microgrids as well.

Dr. Peter Kadar

Peter Kadar was born in 1963, Budapest, Hungary. He received Power Engineering diploma at Technical University of Budapest 1987; PhD 1994; MBA at Open University, UK, 2002. He works in the area of the Power System control and renewable energies.

First he worked for industry (Power Station and Network Engineering Company), then in research (Research Institute for Measurement and Computing Techniques Department of Industrial Application) and later at a software development company (DYNAdata Ltd.). Between 2002 and 2005 he is the editor in chief of magazine "Electrotechnics".

He is a lecturer of Technical University of Budapest from 1994, and now an associate professor at Óbuda University, Budapest, Hungary and gives lectures about energetics, energy management, renewable systems and informatics in the energy sector, simulation and planning, energetics; power system control, renewable energy sources. He teaches in BSC, MSC and PhD courses. He has more than 170 publications.

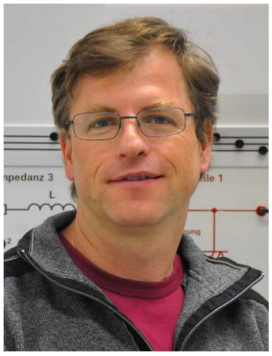
He is the director of the Power System Department in Faculty of Electrical Engineering at Óbuda University, Budapest. He was invited lecturer of Patra Summer University 2007-2014, in Patra, Greece. He is also member of Hungarian Electrotechnical Association (HEA) since 1985, and chair of Scientific and Professional Committee of HEA from 2013. Member of CIGRÉ, member of organising committees of conferences. Senior member of IEEE, Treasurer of IEEE Hungary Section (HS) 2003-2004, Secretary of HS 2005-2008, Vice Chair of HS 2009-2012, Chair of HS from 2013-2016.

PL2. *"Challenges and opportunities of large-scale Power Quality monitoring".* Dr. Jan Meyer. Institute of Electrical Power Systems and High Voltage Engineering. Technische Universitaet Dresden. Germany

The number of devices capable to measure Power Quality is vastly increasing and makes the efficient implementation and analysis of Power Quality measurements a more and more complex and challenging task. A growing ambiguity can be observed among the network operators regarding questions, like where to place the instruments or how valuable information can be extracted from the large data amounts in an efficient and automatic way. This keynote discusses some of the important aspects of Power Quality measurement campaigns covering

e.g. the definition of measurement objectives, the selection of monitoring sites, the accuracy of instrument transformers and methodologies to analyze the measured data. The aspects are illustrated by examples and case studies.

Dr. Jan Meyer



Jan Meyer is a senior lecturer at the Technische Universitaet Dresden, Germany and team leader of the Power Quality research group. He is senior member of IEEE and working on Power Quality since more than 20 years. His research interests include network disturbances and their assessment, especially for harmonics below and above 2 kHz. Further aspects of his research are methods for data analysis of power quality measurements and design issues of large measurement campaigns. He is member of several national and international EMC working groups, several CIGRE working groups as well as member of CIRED TC. Furthermore, he gives regular presentations on current topics in the field of Power Quality and is organizer of several seminars in the field of network disturbances and its assessment.

PL3. *"Proposed Modifications to the IEC 61000-3-X Series for Disturbance Limit Allocations for Installations".* Dr. Mark Halpin

Department of Electrical & Computer Engineering. Auburn University, AL. USA

This keynote address will cover proposed modifications to the IEC 61000-3-X Technical Report series related to harmonics, voltage fluctuations and flicker, and unbalance in LV, MV, and HV/EHV power systems. Topics will include (1) Incorporating energy producing installations, (2) Alternative allocation approaches for optimal network utilization, (3) Simplified flicker limit allocation procedures for low-voltage installations, and (4) Limit allocation considering actual existing disturbance levels. The seminar will be based on the ongoing work of CIGRE/CIRED Joint Working Group C4.40 which is charged with the revision of the Technical Reports in this series.

Dr. Mark Halpin

Dr. Halpin is the Alabama Power Company Distinguished Professor of Electrical and Computer Engineering at Auburn University in Auburn, Alabama and has made many contributions to voltage fluctuation and flicker research and standardization. He is heavily involved in Cigre and IEC activities where he has served as convener of numerous Working Groups dedicated to power quality concerns. He is presently the Convener of IEC TC77/SC77A/WG2 dealing with voltage fluctuations and flicker and he is the Convener of CIGRE/CIRED Joint Working Group C4.40 where he is leading the revisions of the IEC power quality standards for the connection of disturbing installations in the 61000-3-X series. An IEEE Fellow in 2005 "*For contributions to remote power quality measurements and standards,*" Dr. Halpin received the *concerning voltage fluctuations and flicker.*" 1998 IEEE IAS Outstanding Young Member Award and an IEEE Third Millennium Medal. In 2006, he received the IEEE Charles Proteus Steinmetz Award "*For leadership in the development and revision of power systems and power quality standards*" and he received the IEC 1906 Award in 2017 "*For his dedication and his outstanding contribution to EMC standardization in the field of low-frequency conducted disturbances, in particular.*

PL4. *"Electrical Energy Storage - The Future Roles and Challenges".* **Dr. Ahmed F. Zobaa.** Brunel University London, U.K.

Energy storage can arbitrage between imbalances in supply and demand. It can supply more flexibility and balancing to the grid, providing a back-up to intermittent renewable energy. It will play a key role in enabling the world to develop a low-carbon electricity system. There are few available storage technologies at present that are actually economic. The International Renewable Energy Agency (IRENA) has estimated the world would need 150 GW of battery storage by 2030 if it is to meet the desired target of 45 % of power generated from renewable sources. There is limited storage in the EU energy system (around 5% of total installed capacity) almost exclusively from pumped hydro-storage, mainly in mountainous areas.
This talk will cover the technology overview including applications, case studies, main developments, market needs current market, future market potential and the future roles & challenges of electrical energy storage.

Dr. Ahmed F. Zobaa

Ahmed Faheem Zobaa received his B.Sc.(Hons), M.Sc., and Ph.D. degrees in Electrical Power & Machines from Cairo University, Egypt, in 1992, 1997, and 2002, respectively. Also, he received his Postgraduate Certificate in Academic Practice from the University of Exeter, UK in 2010. Also, he received the Doctoral of Science from Brunel University London, UK in 2017. He was an Instructor during 1992-1997, a Teaching Assistant during 1997-2002, and an Assistant Professor during 2002-2007 at Cairo University, Egypt. From 2007 to 2010, he was a Senior Lecturer in renewable energy at University of Exeter, UK. Currently, he is a Senior Lecturer in electrical and power engineering, an MSc Course Director and a Full Member of the Institute of Energy Futures at Brunel University London, UK. His main areas of expertise include power quality, (marine) renewable energy, smart grids, energy efficiency, and lighting applications.

Dr. Zobaa is an Executive Editor for the *International Journal of Renewable Energy Technology.* Also, he is an Editor-in-Chief for *Technology and Economics of Smart Grids and Sustainable Energy*, and *International Journal of Electrical Engineering Education*. He is also an Editorial Board member, Editor, Associate Editor, and Editorial Advisory Board member for many international journals. He is a registered Chartered Engineer, Chartered Energy Engineer, European Engineer, and International Professional Engineer. He is also a registered member of the Engineering Council U.K., Egypt Syndicate of Engineers, and the Egyptian Society of Engineers. He is a Senior Fellow of the Higher Education Academy of U.K. He is a Fellow of the Institution of Engineering and Technology, the Energy Institute of U.K., the Chartered Institution of Building Services Engineers, the Institution of Mechanical Engineers, the Royal Society of Arts, the African Academy of Science, and the Chartered Institute of Educational Assessors. He is a senior member of the Institute of Electrical and Electronics Engineers. Also, He is a member of the International Solar Energy Society, the European Power Electronics and Drives Association, and the IEEE Standards Association.

Panel Session

"Emerging Power Quality Challenges due to the Increasing Share of Modern Power Electronics"

by:

Dr. Mark Halpin
Department of Electrical & Computer Engineering. Auburn University, AL. USA

Dr. Ing. Jan Meyer
Institute of Electrical Power Systems and High Voltage Engineering.
Technische Universitaet Dresden. Germany

Background

The number of power electronic based equipment, especially in low voltage distribution networks, is continuously increasing. The number of inverter-based generation as well as the amount of Electric Vehicles with on-board charger grows vastly and converter-based electrical storage on home level becomes also more and more attractive. These changes will have a significant impact on the Power Quality in future distribution networks, which are even further pronounced by the tendency to reduced damping and inertia.

This short course provides a brief overview of the possible impact of the mentioned developments on the most common Power Quality phenomena (harmonics, unbalance, flicker or the frequency range 2-150 kHz) in low voltage distribution networks. Recent findings are illustrated by results of laboratory and field measurements as well as simulations. Ongoing activities to include the developments into the present EMC standardization are discussed and some remaining open issues are identified.

Agenda

1. Introduction
- Network disturbance mechanism
- Power Quality and EMC

2. Impact of electric vehicle charging and photovoltaic generation
- Results of field measurements
- Simulation of future penetration scenarios

3. Recent developments in standardization
- Standardization framework
- Present activities and challenges

4. Discussion

9:30– 10:15	Wednesday April 10th, 2019 Opening Ceremony ROOM A "U. La Laguna"

10:15-11:00 Plenary Session PL1 ROOM A "U. La Laguna"

Chairman: **Ahmad Pourmovahed**

PL1: "*Battery storage operation for the sake of power system control*".

by **Dr. Péter Kádár.** Professor at Óbuda University, Budapest, Hungary

Wednesday April 10th, 2019
11:00-11:45 Poster Session P1 – Coffee Break ROOM C "AEDIE"

Chairmen: **José Ignacio San Martín Díaz, Cees Keller, Baptiste Genet, Jose Roberto Camacho**

200 Fast-Field Cycling Nuclear Magnetic Resonance relaxometer's electromagnet with optimized homogeneity and reduced volume

P. Videira(1), P. Sebastião(1), A. Roque(2),4, D. M. Sousa(3,4), E. Margato(4,5)
1. Department of Physics & CeFEMA, Instituto Superior Técnico, Universidade de Lisboa. Portugal
2. Department of Electrical Engineering ESTSetúbal/Instituto Politécnico de Setúbal. Portugal
3. DEEC AC-Energia, Instituto Superior Técnico, Universidade de Lisboa. Portugal
4. INESC-ID Lisboa. Portugal
5. CEI, ISEL-Instituo Superior de Engenharia de Lisboa, Instituto Politécnico de Lisboa, and INESC-ID. Portugal

202 Advances in Compression of Power Quality Signals

L. C. M. Andrade(1), T. Nanjundaswamy(3), M. Oleskovicz(1), R. A. S. Fernandes(2), K. Rose(3)
1. Department of Electrical and Computer Engineering, São Carlos School of Engineering, University of São Paulo, São Carlos. Brazil
2. Department of Electrical Engineering, Federal University of São Carlos, São Carlos. Brazil
3. Department of Electrical and Computer Engineering, University of California, Santa Barbara, CA. USA

207 Analysis of Bearing Faulty Cage using Non-Intrusive Condition Monitoring Techniques

Muhammad Irfan(1), Alwadie. A(1), Nordin Saad(2), Muhammad Aman Sheikh(2)
1. College of Engineering, Electrical Engineering Department, Najran University King Abdulaziz Road, Najran. Saudi Arabia
2. Electrical and Electronic Engineering Department, University of Technology PETRONAS Bandar Seri Iskandar, Tronoh. Malaysia

208 **PQD classifier based on higher-order statistics and total harmonic distortion**

Jesús-Manuel González-Bueno, José-Carlos Palomares-Salas, Juan-José González-de-la-Rosa, Olivia Florencias-Oliveros, José-María Sierra-Fernández, Manuel-Jesús Espinosa-Gavira, Agustín Agüera-Pérez
University of Cádiz. Research Group PAIDI-TIC 168 – Computational Instrumentation and Industrial Electronics Dept. of Automation Engineering, Electronics, Architecture and Computer Networks Engineering School of Algeciras. Spain

212 **FEA Analysis and Optimization of Rotor Models in Permanent-Magnet Synchronous Motors fitted with Bonded Rare-Earth Magnets**

V. Abad, J. Sagredo, J. Gonzalez
Electromechanical Department, Polytechnical School of Burgos University. Spain

215 **A novel voltage sag approach during unintentional islanding events: A survey from real recorded events**

Alexandre Serrano Fontova(1,2), P. Casals Torrens(1), R. Bosch(1)
1. Department of Electrical Engineering.E.T.S.E.I.B, Polytechnic University of Catalonia , Barcelona. Spain
2. Electrica Serosense Distribuidora,Torres de Segre. Spain

216 **Analysis of a lift augmented hydrofoil for hydrokinetic turbines**

Chica E(1)., Aguilar J.(1) Rubio Clemente A.(2)
1. Departamento de Ingeniería Mecánica, Facultad de Ingeniería, Universidad de Antioquia, Medellín. Colombia.
2. Facultad de Ingeniería, Tecnológico de Antioquia–Institución Universitaria TdeA, Medellín. Colombia

223 **Shape optimization of a multi-element hydrofoil for hydrokinetic turbines using response surface methodology**

Rubio Clemente A(1,2), Aguilar J(2), Chica E(2)
1. Facultad de Ingeniería, Tecnológico de Antioquia–Institución Universitaria TdeA, Medellín. Colombia.
2. Departamento de Ingeniería Mecánica, Facultad de Ingeniería, Universidad de Antioquia UdeA, Medellín.Colombia

226 **Islanding Detection Method for Inverter-Based Distributed Generation by Injecting Second Order Harmonic Current**

Byung-Moon Han
Dept. of Electrical Engineering Myongji University Yongin. Korea

229 **Optimal control for quadrotors during inspection of power utility assets.**

A. Ailon
Department of Electrical and Computer Engineering. Ben Gurion University of the Negev, Tel Aviv. Israel

230 **Application of PSO algorithms for VPP operation optimization**

D. Kaczorowska(1), J. Rezmer(1), T. Sikorski(1), P. Janik(2)
1. Faculty of Electrical Engineering Wroclaw University of Science and Technology.
2. Tauron Ekoenergia Obroncow Pokoju Jelenia Gora. Poland

233 **Modeling Three-Phase Transformers**

I. F. Novais, A. A. P. Junior, S. F. P. Silva
FEELT-College of Electrical Engineering UFU, Federal Univ. of Uberlândia. Brazil

237 **Phase Equilibrium for Clathrate Hydrates Formed with Difluoromethane and N-Methylpiperidine for Hydrate-Refrigeration System**

Y. Kondo(1, K. Murayama(1), A. Ruiz(1), S. Takeya(2), K. Nemoto(1), R. Ohmura(1)
1. Department of Mechanical Engineering, Keio University Kohoku-ku, Yokohama.
2. National Institute of Advanced Industrial Science and Technology (AIST). Tsukuba, Ibaraki. Japan

238 **Theoretical performance analysis of hydrate-based refrigeration system**

R. Matsuura, K. Watanabe, Y. Yamauchi, H. Sato, R. Ohmura
Department of Mechanical Engineering Keio University Kouhoku-ku,Yokohama.

240 **A Distributed Power Sharing Approach for Islanded Microgrids**

V. Hoang, Hong-Hee Lee
School of Electrical Engineering University of Ulsan. Korea

242 **Operation of small isolated power system with large non-controllable RES penetration – System Operator's experience in El Hierro Island**

R. Corujo, P. Santos, R. Ascanio
Isolated System Department Red Eléctrica de España S.A.U. (REE) Alcobendas, Madrid. Spain

315 **Selection of favourable sites for offshore wind farm development in Greece based on technical criteria**

F. Karathanasi(1,2), T. Soukissian(1), P. Drakopoulou(1), V. Loukaidi(1)
1. Institute of Oceanography Hellenic Centre for Marine Research. Greece
2. Department of Naval Architecture and Marine Engineering National Technical University of Athens. Greece

Wednesday April 10th, 2019
11:45 - 13:00 Oral Session A1 ROOM A "U. La Laguna"

Chairman: **Reinaldo Castro Souza**

220 **Optimization of a solar irradiation forecasting tool based on artificial intelligence**
F. Rodríguez(1,2), A. Galarza(1,2), L. Fontán(1,2)
1. Ceit, Donostia/San Sebastián. Spain.
2. Universidad de Navarra, Tecnun, Donostia/San Sebastián. Spain

274 **Photovoltaic systems – sources and targets of fire risks**
M. Belik
Department of Power Engineering and Ecology University of West Bohemia Plzen. Czech Republic

296 **Impact of OLTC equipped transformer operation on PV installation in urban distribution network**
N. Srećković, N. Lukač, G. Štumberger
University of Maribor Faculty of Electrical Engineering and Computer Science. Slovenia

344 **A Dynamic Maximum Power Point Tracking Algorithm Applied to a PV Array System: A Study Case**
Nubia Ilia Ponce de León Puig, Leonardo Acho, José Rodellar
Universitat Politècnica de Catalunya, Department of Mathematics, Escola d'Enginyeria Est-EEBE, Barcelona. Spain

355 **Integration of Thermoelectric generators (TEG) in Solar PVT panels**
Ángel A. Bayod-Rújula(1), Amaya Martínez-Gracia(2), Alejandro Del Amo(3), Marta Cañada(3), Sergio Usón(2), Javier Uche(2), Juan A. Tejero(1)
1. CIRCE Institute - Department of Electrical Engineering, University of Zaragoza. Spain
2. CIRCE Institute - Department of Mechanical Engineering, University of Zaragoza. Spain
3. Abora Solar S.L. Advanced solar energy. La Muela, Zaragoza. Spain

13:00 – 15:00	Welcome Lunch

Wednesday April 10th, 2019
11:45 - 13:00 Oral Session B1 ROOM B "CIRCUTOR"

Chairman: **José Francisco Gómez González**

304 **Efficiency improvement with intelligent control of induction motor drives**
R. Mecke
Department of Automation and Computer Sciences Harz University of Applied Sciences Wernigerode. Germany

320 **Methods for the verification of protective measures for safety of DC charging stations for electric vehicles**
Daniel Herbst , Robert Schuerhuber, Ernst Schmautzer
Institute of Electrical Power Systems Graz University of Technology. Austria

338 **Is there any example of an isolated system in nature? What is the applicability of the second law of thermodynamics?**
Oliveira, L. E.
Department of Conservation and Biodiversity AI, Abepoli Institute Center I Branca, São Paulo. Brasil

343 **Modelling of Charging Demand for Electric Vehicle based on Person-trip Survey Data**
T. Kato(1), T. Matsuki(2), M. Imanaka(1), M. Kurimoto(1), S. Sugimoto(1)
1. Institute of Materials and Systems for Sustainability
2. Department of Electrical Engineering, School of Engineering Nagoya University Japan

347 **Photovoltaic charging multi-station with modular architecture for Light Electric Vehicles**
Guillén-Arenas, Francisco Jesús(1), Fernández-Ramos, José(1), Gago-Calderón, Alfonso(2)
1. Departamento de Electrónica Escuela de Ingenierías Industriales, Universidad de Málaga. Spain
2. Departamento de Expresión Gráfica, Diseño y Proyectos Escuela de Ingenierías Industriales, Universidad de Málaga. Spain

13:00 – 15:00	Welcome Lunch

Wednesday April 10th, 2019
15:00 - 17:00 Panel Session ROOM B "CIRCUTOR"

Chairman: **Mircea Ion Buzdugan**

"Emerging Power Quality Challenges due to the Increasing Share of Modern Power Electronics"

Dr. Mark Halpin. Department of Electrical & Computer Engineering. Auburn University, AL. USA

Dr. Ing. Jan Meyer. Institute of Electrical Power Systems and High Voltage Engineering. Technische Universitaet Dresden. Germany

9:30 – 11:00	Thursday April 11th, 2019 Plenary Sessions - ROOM A "U. La Laguna"

9:30 - 10:15 Plenary Session PL2 ROOM A "U. La Laguna"

Chairwoman: **Inmaculada Zamora Belver**

PL2: *"Challenges and opportunities of large-scale Power Quality monitoring".*

by **Dr. Jan Meyer.** Institute of Electrical Power Systems and High Voltage Engineering. Technische Universitaet Dresden. Germany

10:15 - 11:00 Plenary Session PL3 ROOM A "U. La Laguna"

Chairman: **Gianpaolo Vitale**

PL3. *"Proposed Modifications to the IEC 61000-3-X Series for Disturbance Limit Allocations for Installations".*

by **Dr. Mark Halpin.** Department of Electrical & Computer Engineering. Auburn University, AL. USA

Thursday April 11th, 2019
11:00 - 11:45 Poster Session P2 – Coffee Break ROOM C "AEDIE"

Chairmen: **José Fernández Ramos, Sebastien Jacques, Daniel Herbst, Antonio Jesús López Martín**

218 Sustainable Energies as an Educational Challenge: Regarding Engineering Studies at the University of Girona

J.R. González, L. Pacheco, N. Luo, T. Pujol, I. Ferrer
Polytechnic School, University of Girona. Spain

243 Mediterranean – Dead Sea Channel for Preserving Dead Sea Level and Increasing Solar Energy Production

S. Lineykin(1), A. Averbukh(2), M. Averbukh(3)
1. Department of Mechanical Engineering and Mechatronics Ariel University. Israel
2. Department of Public Relations Ariel University. Israel
3. Department of Electric/Electronic Engineering Ariel University. Israel

244 **Comparison of the performance of different mixing ventilation configurations in particle removal from indoor spaces**

C. Habchi(1), K. Ghali(2), N. Ghaddar(2)
1. Mechanical Engineering Department, Faculty of Engineering, Lebanese University. Lebanon
2. Department of Mechanical Engineering American University of Beirut. Lebanon

250 **Analysis of Electrical Microgrids and Associated Technologies**

J.I. San Martin(1), F.J. Asensio(1), I. Zamora(2), G. Saldaña(1), O. Oñederra(2), I.J. Oleagordía(2)
Department of Electrical Engineering - University of the Basque Country (UPV/EHU)
1. Engineering School of Gipuzkoa, Eibar. Spain
2. Engineering School of Bilbao. Spain

251 **Reliable Power Supply of Islanded Locations through Microgrids**

I. Zamora(1), J.I. San Martin(2), F.J. Asensio(2), G. Saldaña(2), O. Oñederra(1), U. Goitia(1)
Department of Electrical Engineering - University of the Basque Country (UPV/EHU)
1. Engineering School of Bilbao. Spain)
2. Engineering School of Gipuzkoa, Eibar. Spain

253 **Long Term Dynamic of Power System with renewable energy sources and energy storage systems**

K. Máslo(1), A. Kasembe(2)
1. Department of Transmission System Analysis
2. Department of System Development ČEPS,a.s Prague. Czech Republic

256 **State estimation for large power distribution systems**

J. Besada Juez(1), A. González Bordagaray(2), J. Ferro Vázquez(2), G. Plaza González(1)
1. Department of Software Engineering Qwi Tecnologías de la Información. Madrid. Spain
2. Operation Technical Services Iberdrola Distribución Eléctrica Complejo. Bilbao. Spain

260 **DC Microgrid for Robotic Manufacturing – field demonstration and laboratory experience**

Armands Senfelds, Ansis Avotins, Leonids Ribickis, Peteris Apse-Apsitis
Department of Industrial Electronics and Electrical Technologies Riga Technical University Riga. Latvia

261 **Comparative analysis of photovoltaic modules center and edge temperature using IoT embedded system**

Renata I. S. Pereira(1), Sandro C. S. Jucá(2), Paulo C. M. Carvalho(1), Luis M. Fernández-Ramírez(3)

1. Department of Electrical Engineering Federal University of Ceará (UFC). Brazil
2. Academic Master's Program in Renewable Energy (PPGER) Federal Institute of Ceará (IFCE) . Brazil
3. Research Group in Electrical Technologies for Sustainable and Renewable Energy (PAIDI-TEP-023) Department of Electrical Engineering, University of Cádiz. Escuela Politécnica Superior de Algeciras. Spain

263 **Harmonic Distortion Evaluation of CEA's FAB Feeder**

T. M. Soares(1), J. L. Tostes(1), L. C. dos Santos Junior(1), M. L. de Lima Tostes(1), U. H. Bezerra(1), D. C. Mendes(2)

1. Centro de Excelência em Eficiência Energética da Amazônia Universidade Federal do Pará, Belém. Brazil
2. Departamento de Eficiência Energética Companhia de Eletricidade do Amapá. Brazil

268 **Analysis of Impact of One Unit of Distributed Photovoltaic Generation in Power Quality of a Rural Property**

Santos, E. A dos(1), Ferreira, L. R. A(2), Almeida, A. B(1), Otto, R. B(2), Vendrame, M. G(3)

1. Centro de Engenharias e Ciências Exatas (CECE) UNIOESTE, State University of Western Paraná .Foz do Iguaçu – Paraná. Brazil
2. Automation and Simulation of Electrical Systems Laboratory (Lasse) Itaipu Technological Park (PTI). Foz do Iguaçu – Paraná. Brazil
3. Renewable Energy Advice Itaipu Binational (ITAIPU) Foz do Iguaçu – Paraná. Brazil

275 **Enhancing the efficiency of passive solar systems**

M. Belik

Department of Power Engineering and Ecology. University of West Bohemia Plzen. Czech Republic

276 **Hydrothermal simulations in Brazil using batteries - First Results**

C. Dall'Orto(1), B. Bezerra(1), R. Novaes(1), F. Nazaré(1), P. Rosas(2), P. Furlanetto(3), W. Teixeira(4), J. Tuo(5), C. Xinjian(5), Chai Jiyong(5)

1. PSR Botafogo – Rio de Janeiro. Brazil
2. Universidade Federal de Pernambuco (UFPE) Brazil
3. Instituto de Tecnologia Edson Mororo Moura – ITEMM. Brazil
4. CPFL Energia (CPFL) Campinas – SP. Brazil
5. State Grid international Development Co. Campinas – SP. Brazil

278 Conservative Power Theory (CPT): A New Approach to the Tuned Passive Filter Design

G.J. Schäffer(1), F. A. M. Moura(1), M. V. B. Mendonça(1), A. J. P. R. Júnior(1), M. R. M. C. Albertini(1), J. R. Camacho(2)
(IEEE-SM) Electrical Engineering Department
1. Universidade Federal do Triângulo Mineiro, Uberaba - Minas Gerais, Brazil Electrical Engineering Faculty. Brazil
2. Universidade Federal de Uberlândia, Uberlândia - Minas Gerais. Brazil

279 Reduction of Electrical Losses' Analysis on Distribution Systems with Distributed Generation and Energy Storage Systems

N.M. Neto(1), M. R. C. Albertini(1), W. B. De Melo(1), M. V. B. Mendonça(1), A. J. P. R. Júnior(1), F. A. M. Moura(1), J. R. Camacho(2)
Electrical Engineering Department
1. Universidade Federal do Triângulo Mineiro, Uberaba - Minas Gerais. Brazil Electrical Engineering Faculty. Brazil
2. Universidade Federal de Uberlândia, Uberlândia - Minas Gerais. Brazil

280 Wind Energy in Brazil: Current Overview and Projections on Power Generation

Fernando de Lima Camargo(1,2), Nilcéia Cristina dos Santos(1), Reinaldo Gomes da Silva(1,2)
1. Faculdade de Tecnologia de Piracicaba "Dep. Roque Trevisan" (FATEC PIRACICABA) CEETPS, Centro Estadual de Educação Tecnológica Paula Souza. Brazil
2. Escola de Engenharia de Piracicaba (EEP) FUMEP, Fundação Municipal de Ensino de Piracicaba. Brazil

282 Evolution of the Brazilian Electrical Power System: Coupling Storage and Renewable Resources

W. Teixeira(1), C. Dall'Orto(2), P. Rosas(3), P. Furlanetto(4), J. Tuo(5), C. Xinjian(5), C. Jiyong(5)
1. CPFL Energia (CPFL) Campinas – SP. Brazil
2. PSR.Botafogo – Rio de Janeiro. Brazil
3. Universidade Federal de Pernambuco (UFPE) Cidade Universitária, Recife - PE –CEP. Brazil
4. Instituto de Tecnologia Edson Mororo Moura – ITEMM. Brazil
5. State Grid international Development Co. Burnier, 1755 -, Campinas – SP. Brazil

Thursday April 11th, 2019
11:45 - 13:00 Oral Session A2 ROOM A "U. La Laguna"

Chairman: **Rudolf Mecke**

232 **Is Objection to Wind Energy Justified?**
M. Alrefai(1), A. Pourmovahed(2)
1. Mechanical Engineering
2. Mechanical Engineering. Kettering University Flint, Michigan. USA

236 **Evaluation of Energy Sources Capable of Drought/Famine Abatement in an African Village**
M. Alrefai(1), A. Pourmovahed(2)
1. Mechanical Engineering Department
2. Mechanical Engineering, Kettering University Flint, Michigan, U.S.A.

293 **Impact of Short-Circuit Impedance Model for Variable-Speed Wind Turbine Generators on Operation of Overcurrent Relays**
L. Somi, B. Polajžer, G. Štumberger
University of Maribor Faculty of Electrical Engineering and Computer Science, Maribor. Slovenia

313 **Damage diagnosis for offshore fixed wind turbines**
D. Agis, Y. Vidal, F. Pozo
Mathematics Department, Control, Modeling, Identification and Applications, Escola d'Enginyeria de Barcelona. Spain

314 **Preliminary study of a concept of wind-tidal turbine coupling using functional similarities of real time emulation**
Cristian Nichita(1), Mohmed Ashglaf(1) , Yacine Amara(1), Chul H. Jo(2)
1. University of Le Havre - Normandy
Research Group in Electrical Engineering and Automatics GREAH, Le Havre Cedex. France
2. Inha University, Ocean Engineering Laboratory, Inchoen. Korea

13:00 – 15:00	Lunch

Thursday April 11th, 2019
11:45 - 13:00 Oral Session B2 ROOM B "CIRCUTOR"

Chairman: **Milan Belik**

210 **Optimal Design Method for Lightweight Buildings to minimize a Cooling Load with PCMs using Orthogonal Experimental Design**
Akbar Halimov, Moritz Lauster, Dirk Müller
Institute for Energy Efficient Buildings and Indoor Climate, E.ON Energy Research Center, RWTH Aachen University. Germany

224 **Lithium-ion energy storage battery in PV-smart building application**
Mohamed A. H. El-Sayed
Department of Electrical Engineering, College of Engineering and Petroleum, Kuwait University (On leave from Electrical Power Engineering Department, Cairo University

249 **Analysis of a lead-acid battery storage system connected to the continuous bus of a four quadrants converter to a microgrid**
A. F. J. Rocha-Henríquez(1), B. J.M. Cabrera-Peña(2), C. R. Aguasca-Colomo(3), D. M. Méndez-Babey(3), E. P. Rivera-Rodríguez(2)
1. Department of Renewable Energy Instituto Tecnológico de Canarias, (ITC S.A.) Las Palmas. Spain
2. Instituto Universitario de Microelectrónica Aplicada (IUMA), Universidad de Las Palmas de Gran Canaria (ULPGC). Spain
3. Instituto Universitario de Sistemas Inteligentes y Aplicaciones Numéricas en Ingeniería (IUSIANI), Universidad de Las Palmas de Gran Canaria (ULPGC). Spain

312 **A New Software Tool to Highlight Money Savings Made by a Demand Side Management System for Home Appliances**
Sébastien Bissey(1), Sébastien Jacques(1), Jean-Charles Le Bunetel(1), Yves Raingeaud(1), Philippe Ravier(2), Guy Lamarque(2)
1. University of Tours ,GREMAN CNRS. France
2. University of Orléans PRISME UPRES. France

325 **Effectiveness of Chilled ceiling assisted by intermittent personalized ventilation for active contaminants' confinement and energy savings**
D. Al Assaad K. Ghali, N. Ghaddar
Department of Mechanical Engineering American University of Beirut. Lebanon

13:00 – 15:00	Lunch

Thursday April 11th, 2019
15:00 - 16:15 Oral Session A3 ROOM A "U. La Laguna"

Chairman: **Ewen Constant**

258 **Laboratory for Analysis of Microgrid with Real Time Simulation**
A. B. Piardi(1), R. B. Otto(1), D. G. Sonoda(1), F. C. Santos(1), L.R.A Ferreira(1) R. A. Ramos(2)
1. Itaipu Technological Park Foundation LASSE - FPTI Foz do Iguaçu –PR. Brazil
2. University of São Paulo. Brazil

270 **Power Quality Survey in a State of the Art Microgrid**
H. Kirkeby(1), O. Johansson(2)
1. PQA AS Skippergata, Oslo. Norway
2. Sivilingeniør Carl Christian Strømberg AS Stabburveien Fredrikstad. Norway

309 **Design and Analysis of Solar/Wind Micro Grid Converters**
Akram A. Abu-aisheh, Hemchandra Shertukde
Department of Electrical and Computer Engineering University of Hartford, West Hartford, CT. USA

376 **FACTS Family for Voltage Sag Alleviation: Performance Study and Analysis**
Shazly A.Mohamed(1), N. Luo(2), J.R. González(2), T. Pujol(2), L. Pacheco(2)
1. Department of Electrical Engineering, Faculty of Engineering, South Valley University, Qena. Egypt
2. Polytechnic School, University of Girona. Spain

381 **Reactive power management to enhance solar energy penetration in small grids: technical and framework approaches**
B. González Díaz(1), J.F. Gómez González(1), D. Cañadillas Ramallo(2), J.A. Méndez Pérez(3), R. Guerrero Lemus(2)
1. Departamento de Ingeniería Industrial, Escuela Superior de Ingeniería y Tecnología, Universidad de La Laguna, Tenerife. Spain
2. Departamento de Física, Facultad de Ciencias, Universidad de La Laguna, Tenerife. Spain
3. Departamento de Ingeniería Informática y de Sistemas, Escuela Superior de Ingeniería y Tecnología, Universidad de La Laguna, Tenerife. Spain

Thursday April 11th, 2019
15:00 - 16:15 Oral Session B3 ROOM B "CIRCUTOR"

Chairman: **Mohamed El Sayed**

205 **Faulty Readings of Static Energy Meters Caused by Conducted Electromagnetic Interference from a Water Pump**
Bas ten Have(1), Tom Hartman(1), Niek Moonen(1), Cees Keyer(1,2), Frank Leferink(1,3)
1. University of Twente. The Netherlands
2. University of Applied Sciences, Amsterdam.The Netherlands
3. Thales Nederland B.V., Hengelo.The Netherlands

257 **Energy harvesting approaches in IoT scenarios with very low ambient energy**
A. Lopez-Martin, J.M. Algueta, I.R. Matías
Institute of Smart Cities Public University of Navarra, Pamplona. Spain

332 **Monitoring Systems Parameters, Sensors and Technologies for Renewable Energies: Biogas Case Study**
F.P. Silva, R.B. Otto, A.A. Braggio, D.S. Kitamura
Laboratory of Automation and Simulation of Power Systems Itaipu Technological Park (PTI). Foz do Iguaçu – Paraná. Brazil

357 **The Residual Load Duration Curve (rLDC) to model an energy system**
W.-G. Früh
Institute of Mechanical, Process and Energy Engineering, School of Engineering and Physical Sciences, Heriot-Watt University Riccarton, Edinburgh, Scotland. United Kingdom

362 **Automatic classification of circuit topologies of appliances based on higher order statistic**
Olivia Florencias Oliveros (1), Ana María Blanco(2), Jan Meyer(2), Juan José González de la Rosa(1), Agustín Agüera Pérez(1)
1. Research Group PAIDI-TIC-168: Computational Instrumentation and Industrial Electronics. Higher Polytechnic School of Algeciras. University of Cádiz. Spain
2. Institute for Electrical Power Systems and High Voltage Engineering Technische Universität Dresden. Germany

Thursday April 11th, 2019
16:15 - 17:00 Poster Session P3 – Coffee Break ROOM C "AEDIE"

Chairmen: **José Ramón González Castro, Thiago Mota Suares, Karel Máslo, Angel Bayod Rújula**

288 **Radial Basis Function for Solar Irradiance Forecasting in Equatorial Areas**

Marcello Anderson F. B. Lima(1), Paulo C. M. Carvalho(1), Arthur P. S. Braga(1), Renata I. S. Pereira(1), Sandro C. S. Jucá(2), Luis M. Fernández-Ramírez(3), Josileudo R. Leite(4)
1. Department of Electrical Engineering Federal University of Ceará (UFC). Brazil
2. Academic Master's Program in Renewable Energy (PPGER) Federal Institute of Ceará (IFCE). Brazil
3. Research Group in Electrical Technologies for Sustainable and Renewable Energy (PAIDI-TEP-023) Department of Electrical Engineering, University of Cádiz (UCA) Escuela Politécnica Superior de Algeciras. Spain
4. Department of Industrial Mechatronics Federal Institute of Ceará (IFCE). Brazil

290 **Forecasting of the Photovoltaic Electricity Production on a Sail Ship by Taking Account Shadow Effects**

B. Genet(1) , V. Boitier(1) , Y. Briere(2), F. Defaÿ(2)
1. CNRS, LAAS, Toulouse. France
2. ISAE-SUPAERO,Toulouse. France.

292 **About some Effects of Voltage Harmonics on End User Equipment**

M. Buzdugan
Technical University of Cluj-Napoca. Romania

295 **A Double Stage DC/DC Converter for LED Lighting Automotive Systems**

Marco Failla(1), Gianpaolo Vitale(2)
1. Dipartimento di Energia, Ingegneria dell'Informazione e Modelli Matematici, Università degli Studi di Palermo. Italy
2. ICAR, Institute for high performance computing and networking, National Research Council (CNR), Palermo. Italy

299 **Thin-film PV modules early degradation analysis: a case study on CIGS.**

A.M. Diez-Suárez(1), C. Martínez Fernández(1), A. González-Martínez(1), L. Álvarez-de Prado(2), A. de la Puente-Gil(1), J.J. Blanes-Peiró(1), M. de Simón-Martín(1)
1. Area of Electrical Engineering Energy Resources' Smart Management (ERESMA) Research Group School of Energy and Mining Engineering, Universidad de León. Spain
2. Area of Cartographic, Geodesic and Photogrammetric Engineering Energy Resources' Smart Management (ERESMA) Research Group School of Energy and Mining Engineering, Universidad de León. Spain

300 **GIS-based model for determining the optimal potential of co-digestion mixtures in the Spanish Iberian Peninsula**

A. González-Martínez(1), M. de Simón-Martín(1), A.M. Diez Suárez(1), Á. de la Puente-Gil(1), M.Á. Ramos-Malmierca(1), L. Álvarez-de Prado(2)
1. Area of Electrical Engineering Energy Resources' Smart Management (ERESMA). Research Group School of Energy and Mining Engineering, Universidad de León. Spain
2. Area of Cartographic, Geodesic and Photogrammetric Engineering Energy Resources' Smart Management (ERESMA) Research Group School of Energy and Mining Engineering, Universidad de León. Spain

302 **Study and Implementation of a Computational Platform to Drive a Switched Reluctance Motor 8x6 for Electric Vehicles Applications**

M.B.S.Pinto, G.P.Viajante1,M.E.Oliveira, E.N.Chaves, M.A.A.Freitas
Federal Institute of Education, Science and Technology of Goiás. Brazil

310 **Intensive Agriculture Production in Low Consumption Energy Environment**

J. Galvão(1,2), A. Nabais(3), H. Correia(1), P. Amaro(1), A. Negrão(1,4), V. Ribeiro(5,6)
1. Department of Electrical Engineering, ESTG - Leiria Polytechnic Institute.
2. R&D Unit, Institute for Systems Engineering and Computers /INESC Coimbra.
3. ECOBIE - Engenharia Lda, Leiria. Portugal
4. Instituto de Astrofísica e Ciências do Espaço, Lisboa. Portugal
5. ciTechCare - School of Health Sciences, Leiria Polytechnic Institute. Portugal
6. GeoBioTec - Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa Caparica. Portugal

318 **Business Model to the LASSE performance at Microgrid environment**

W. Polini(2), R. C. Lotero(2), R. B. Otto(1)
1. LASSE – Automation and Electrical Systems Simulation Laboratory Parque Tecnológico Itaipu – Foz do Iguaçu, Paraná. Brazil
2. UNIOESTE – Paraná West State University Região Norte, Foz do Iguaçu, Paraná. Brazil

319 **Thermal and Exergy Efficiency Analysis of a Solar-driven Closed Brayton Power Plant with Helium & s-CO2 as Working Fluids**

C. Arnaiz del Pozo, S. Sanchez-Orgaz, J. Rodríguez Martín, A. Jiménez Álvaro, I. López Paniagua, C. González Fernández, R. Nieto Carlier
ETSI Industriales-Universidad Politécnica de Madrid. Spain

323 **Study of the requirements of an autonomous system to monitorize surface water quality**

M. Barros(1), P. Granchinho(1), C. Ferreira(1), P. Neves(1), H. Pinho(1), L. Santos(1), B. Lopes(1), J. Marques (1), S. Mourato(2), A. Martins(3)
1. Departmental engineering unit E.S.T.T., Institute Polytechnic of Tomar (IPT)
2. Institute Polytechnic of Leiria (IPL). Portugal
3. Intermunicipal Community of Médio Tejo (CIMT). Portugal

326 **Use of FACTS for Improving Voltage Stability in Mining Applications**

J. L. Olabarrieta Rubio(1), P. Eguia Lopez(2), E. Torres Iglesias(2), A. Etxegarai Madina(2)
1. ABB Ring Motors. Spain
2. Department of Electrical Engineering, Faculty of Engineering of Bilbao, Universidad del País Vasco UPV/EHU. Spain

329 **Harmonics and Flicker in an Iron and Steel Industry with AC arc furnaces**

M. Pérez-Donsión(1), S. Jar Pereira(2), F.T. Soares Oliveira(3)
1. Electrical Engineering Department. Vigo University. Vigo. Spain
2. Industrias Jar. Lalin. Pontevedra. Spain
3. Department of Electrical Engineering, E.S.T.G., Polytechnic Institute of Leiria.

333 **LED TV: Computational Modelling and Validation Under Ideal and Non-Ideal Supply**

Paulo H. O. Rezende(1), Afonso B. Almeida Jr. (2), Isaque N. Gondim(1), José C. de Oliveira(1), Carlos E. S. P. Filho(3), Jean E. Costanzi(4), Amilton F. Cardoso Jr.(4)
1. FEELT - Universidade Federal de Uberlândia. Brazil
2. IFTM - Instituto Federal do Triângulo Mineiro. Brazil
3. Instituto de Pesquisa Eldorado. Brazil
4. Centrais Elétricas de Santa Catarina S.A. (CELESC). Brazil

336 **Fault Detection and Location in a HVDC grid using a Rate Of Change Of Voltage methodology**

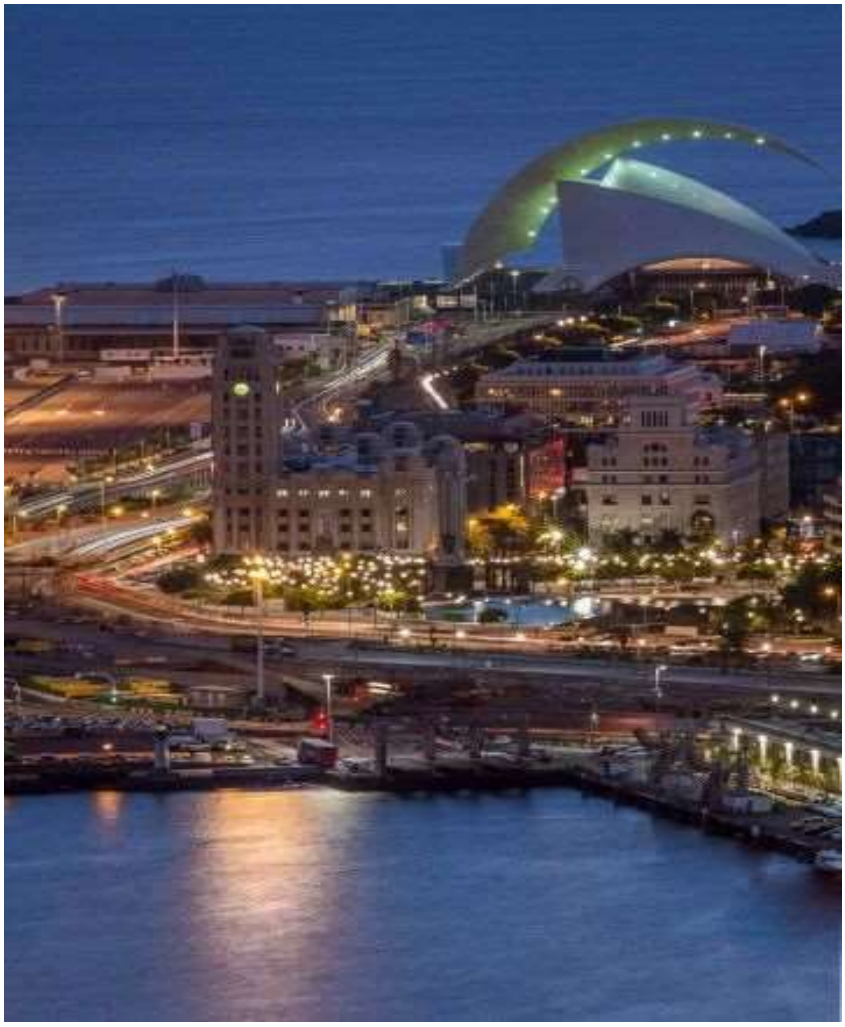
J. Díaz, O. Abarrategi, D.M. Larruskain
Department of Electrical Engineering University of the Basque Country UPV/EHU, Bilbao. Spain

337 **Frequency Domain Models of Power Electronic-based Loads: Impact of Reference Voltage Conditions on the Nonlinearity against Supply Voltage Distortions**

E. Tavukcu, S. Müller, J. Meyer
Technische Universitaet Dresden Institute of Electrical Power Systems and High Voltage Engineering Dresden. Germany

379 **Development and test of distributed ledger technologies applications in a microgrid distributed control**

D. Coll-Mayor, A. Notholt
School of Engineering. Reutlingen University. Reutlingen. Germany



9:30– 10:15	Friday April 12th, 2019 Plenary Session PL4 - ROOM A "U. La Laguna"

Chairman: **Gorazd Štumberger**

PL4. *Electrical Energy Storage - The Future Roles and Challenges.*

by **Dr. Ahmed F. Zobaa**. Brunel University London, U.K.

Friday April 12th, 2019 16:15 - 17:00 Poster Session P3 – Coffee Break ROOM C "AEDIE"

Chairmen: **Enrique Alameda Hernández, Mario Vrazic, António Velho Roque, Victoria Abad San Martin**

246 **Wind power integration improvement in an island by installing battery energy storage systems. Case study of Lanzarote-Fuerteventura**

L. Mejías-García(1), J.F. Medina-Padrón(2), E.J. Medina-Domínguez(1)
1. Renewable Energies Department, Research and Development Division, Canary Island Institute of Technology (ITC), Santa Lucía (Gran Canaria). Spain
2. University Institute of Intelligent Systems and Numeric Applications in Engineering (SIANI), University of Las Palmas de Gran Canaria (ULPGC). Spain

283 **Evaluation of an Overcurrent and Undervoltage Protection Algorithm for HVDC Systems**

M.J. Perez Molina(1), P. Eguia Lopez(1), M. Larruskain Eskobal(1), M. Santos Mugica(2), R. Rodriguez Sanchez(2)
1. Department of Electrical Engineering, Faculty of Engineering of Bilbao, Universidad del País Vasco UPV/EHU. Spain
2. Energy Unit, Tecnalia Parque Tecnológico de Vizcaya. Spain

285 **Metrological characterization of new infrared sensors for robot navigation**

Mazierli D., Zanobini A.
University of Florence, Information Engineering Department, Florence.Italy

345 **Biocarbon supported Fe2P particles for HER for energy applications**

E. Leal da Silva(1), C.F. Malfatti(2), G.R. Gonçalves(3), Miguel A. Schettino Jr(.3), Jair C. C. Freitas(3), A. Cuña(1)
1. Area Fisicoquímica, DETEMA, Facultad de Química, Universidad de la República, Montevideo. Uruguay
2. LAPEC/PPGE3M, Universidade Federal do Rio Grande do Sul, Porto Alegre/RS
3. Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espírito Santo, Vitória, ES. Brazil

348 **Estimation of required power and energy for bicycle electrification using global positioning system**

D. Penić(1), M. Štambuk(2), N. Raičević(3), M. Vražić(1)
1. Department of Electric Machines, Drives and Automation, University of Zagreb Faculty of Electrical Engineering and Computing, Zagreb. Croatia
2. Vertiv Croatia d.o.o, Selska cesta ,Zagreb. Croatia
3. Department of Theoretical Electrical Engineering, University of Nis Faculty of Electronic Engineering, Niš. Serbia

349 **Use of commercial TiO2 as direct ethanol fuel cell electrocatalyst support**

L. M. M. Brasil(1), C. F. Malfatti(1), M. Cadorin(1), L.A.S. Ries(2)
1. LAPEC/PPGE3M, UFRGS, Porto Alegre/RS. Brazil
2. UERGS, Novo Hamburgo/RS. Brazil

352 **Transient Analysis of Electric Energy Distribution Systems with Distributed Generators during Contingencies**

Wandry Rodrigues Faria(1), Marcelo Escobar de Oliveira(2), Jonas Villela de Souza(1), Luis Gustavo Wesz da Silva(2), Ghunter Paulo Viajante(2)
1. Department of Electrical Engineering São Carlos School of Engineering, University of São Paulo. Brazil
2. Núcleo de Pesquisas em Sistemas de Energia - NuPSE Federal Institute of Education, Science and Technology of Goiás - IFG Itumbiara – Goiás. Brazil

359 **Heat treatment of iron/carbon composites for energy storage: effect on physicochemcial and electrochemical properties**

J. R. F. Gonçalves(1), C.F. Malfatti(1), E. Leal da Silva(1,2), G.R. Gonçalves(3), Miguel A. Schettino Jr.(3), Jair C. C. Freitas(3), A. Cuña(2)
1. LAPEC/PPGE3M, Universidade Federal do Rio Grande do Sul, Porto Alegre/RS Brazil
2. Area Fisicoquímica, DETEMA, Facultad de Química, Universidad de la República, Montevideo. Uruguay
3. Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espírito Santo, Vitória, ES. Brazil

360 **Evaluation of the potential utilization of conventional and unconventional biomass wastes resources for energy production**

M.Torres(1), P. Portugau(1), J. Castiglioni(1), L. Yermán(2), A. Cuña(1)
1. Area Fisicoquímica, DETEMA, Facultad de Química – Universidad de la República, Montevideo. Uruguay
2. School of Civil Engineering, The University of Queensland, Brisbane. Australia

366 **Proposal of Novel Single-Phase Power Quality Indicators considering subsynchronous frequency perturbations in Voltage and Current under non-sinusoidal conditions**

J. El Mariachet(1), J. Matas(1), 1H. Martin, G. Tinoco(2)
1. Department of Electrical Engineering, Universidad Politécnica de Cataluña (UPC), Barcelona. Spain
2. Department of Electrical Engineering, Universidad Michoacana. de San Nicolás de Hidalgo, Morelia. Mexico

368 **IoT Monitoring systems applied to photovoltaic generation: The relevance for increasing decentralized plants**

João L. F. Victor(1), Sandro C. S. Jucá(1), Renata I. S. Pereira(2), Paulo C. M. Carvalho(2), Luis M. Fernández-Ramírez(3)
1. Academic Master's Program in Renewable Energy (PPGER) Federal Institute of Technology of Ceará (IFCE). Brazil
2. Department of Electrical Engineering Federal University of Ceará (UFC). Brazil
3. Research Group in Electrical Technologies for Sustainable and Renewable Energy (PAIDI-TEP-023) Department of Electrical Engineering, University of Cádiz (UCA) Escuela Politécnica Superior de Algeciras. Spain

370 **Red Macroalgae Kappaphycus alvarezii as feedstock for nutraceuticals, pharmaceuticals and fourth generation biofuel production**

Oliveira, L.E.(1), Cedeno, R. F.(2), Chavez, E. G.(2), Gelli, V. C.(3), Masarin, F(2)
1. Department of Biodiversity and Conservation A.I., Abepoli Institute Center I – Santa Branca, São Paulo. Brazil
2. Department of Bioprocesses and Biotechnology UNESP, Paulista State University Faculty of Pharmaceutical Science –São Paulo. Brazil
3. Paulista Agricultural Research Agency I.P., Fisheries Institute Secretariat of Agriculture and Supply of the State of São Paulo - São Paulo. Brazil

372 **An intelligent strategy for hybrid energy system management**

I. Riverón(1), J.F. Gómez(2), B. González(2), J. Albino Méndez(1)
1. Department of Computer Science and Systems Engineering, Universidad de La Laguna, Tenerife. Spain
2. Department of Industrial Engineering Universidad de La Laguna, Tenerife. Spain

375 **Design Strategy of Conventional Electronic for Wireless Sensor Node Powered by Vibration Energy Harvester**

F. Huet, V. Boitier
LAAS-CNRS, Université de Toulouse. France

377 **Voltage Sags in the network and inside the Industrial Plants. Case of PSA-Vigo**

M. Pérez-Donsión(1), N. Louzán Pérez(1), F.T. Oliveira(2)
1. Electrical Engineering Department. Vigo University. Vigo. Spain
2. Department of Electrical Engineering, E.S.T.G., Polytechnic Institute of Leiria.

Friday April 12th, 2019
11:00 - 12:15 Oral Session A4 ROOM A "U. La Laguna"

Chairman: **Benjamín González Díaz**

203 **Capacity Sizing of a Small Hydropower Plant using Assured Energy Analysis**
J.H.I. Ferreira(1), J.R. Camacho(2)
1. Instituto Federal do Triângulo Mineiro. Brazil
2. School of Electrical Engineering, Universidade Federal de Uberlândia. Brazil

272 **Colombia towards an electricity generation matrix using renewable energies**
J. Pérez(1), C. Vargas(1), D. Riaño(2)
1. Department of Electrical Engineering La Salle University. Spain
2. Department of Integral Energy Consulting Bacata Energy S.A.S.
3. DAR – Infraestructura y Energía

286 **Performance of 1.4 kW Grid connected desert type PV A**
H. Al-Badi
Department of Electrical & Computer Engineering College of Engineering, Sultan Qaboos University. Oman

307 **Viability of Distributed Generation with Biogas and Photovoltaic in an Isolated System**
Effrain Roney Bernardes, José Roberto Camacho
School of Electrical Engineering Universidade Federal de Uberlândia. Brazil

353 **Performance analysis of hybrid hydroelectric Gorona del Viento and the basic directions of its perfection**
Oleksandr Novykh(1), Juan Albino Méndez Pérez (1), Benjamín González-Díaz(1), Igor Sviridenko (2)
1. Department of Computing and Systems, Higher School of Engineering and Technology, University of La Laguna, Escuela Superior de Ingeniería y Tecnología. San Cristóbal de La Laguna. Spain
2. Department of Energy Facilities of Ships and Marine Structures, Maritime Institute, State University of Sevastopol. Russia

Friday April 12th, 2019
11:00 - 12:15 Oral Session B4 ROOM B "CIRCUTOR"

Chairman: **Wolf-Gerrit Frü**

254 **System Sizing for Solar Powered Sustainable Energy System Designed for Domestic Users**
Ewen Constant, Kary Thanapalan, Mark Bowkett
Faculty of Computing, Engineering & Science, University of South Wales. United Kingdom

322 **Technical and Economic analysis of a Regulatory Call for PV Plants with Energy Storage in French Islands**
A. Chagnard, B. Francois
Univ. Lille, Arts et Metiers Paristech, Centrale. Laboratoire d'Electrotechnique et d'Electronique de Puissance. France

341 **Characterization of Production under feed-in tariffs in Portugal Mainland**
M. Margalho, P. Lourenço
EDP Serviço Universal, SA Direção Compra de Energia ,Coimbra. Portugal

363 **Global Solar Energy availability model and use in relationship to Ecological Human imprint: Economic Sustainability Impact and Assessment**
Safwat H. Shakir Hanna(1), Pamela Obiomon(1), Irvine W. Osborne-Lee(1), Gian Paolo Cesaretti(2), Rosa Misso(3)
1. Texas Gulf Coast Environmental Data (TEXGED), College of Engineering Prairie View A&M University, Texas. USA
2. Simone Cesaretti Foundation, Somma Vesuviana (Na). Italy
3. University of Naples Parthenope – Department of Economic and Legal Studies. Italy

380 **Solar-assisted heat pump coupled to solar hybrid panels**
A. Martínez-Gracia(1), A. Del Amo(2), S. Torné(3), A. Bayod-Rújula(4), J. Uche(1), S. Usón(1)
1. Department of Mechanical Engineering. CIRCE Institute, University of Zaragoza. Spain
2. Abora Solar S.L. Advanced solar energy. Spain. La Muela, Zaragoza. Spain
3. Ingeniería Torné. Zaragoza. Spain
4. Department of Electrical Engineering. CIRCE Institute, University of Zaragoza. Spain

12:15– 13:00	**ROOM A*"U. de La Laguna"* CLOSING SESSION** **Conclusions and time for the next conference (ICREPQ'20)** **Awards for the three best posters**
13:00 – 15:00	**Farewell Lunch**
15:00 – 20:00	**Excursion for to visit to San Cristobal de La Laguna** **Cultural Property Heritage of the Humanity** by UNESCO-1999 The first model of colonial not strengthened city