

## 11<sup>th</sup> International Conference on Modeling and Simulation of Electric Machines, Converters and Systems



#### Welcome Message

On behalf of the Organising Committee, it is a great pleasure and an honour to welcome you in Valencia for the 11th International Conference on Modeling and Simulation of Electric Machines, Converters and Systems (ELECTRIMACS 2014).

It is now the 30th anniversary of the first ELECTRIMACS conference held in Liege in 1984, followed by successive editions held in Québec (1987), Nancy (1990), Montréal (1993), Saint Nazaire (1996), Lisbon (1999), Montréal (2002), Hammamet (2005), Québec (2008) and Paris (2011).

ELECTRIMACS, the main conference of the IMACS Technical Committee 1 (TC1) on Modeling and Simulation of Electrical Machines, continues in Valencia its long tradition of being a meeting point for researchers to share ideas and advances in the broad fields of Electrical Machines, Converters and Systems and their applications.

The technical program of ELECTRIMACS 2014 will include three Plenary Sessions, with renowned speakers from academia and industry, two tutorial sessions and three parallel tracks with papers from 25 different countries. These papers have been selected from more than 150 submissions received. Each paper has been reviewed by at least three independent reviewers.

ELECTRIMACS 2014 has been co-organised by the the Universitat Politècnica de València and by Université de Tunis El Manar and will be held in the new facilities of the Ciudad Politécnica de la Innovación, located at the East of the Valencia Campus of the Universitat Politècnica de València.

We would like to thank all the individuals and institutions who contributed to the organisation of ELECTRIMACS 2014: the local organising committee, the technical program chairs, the track and special session chairs, the tutorial chairs, the members and honorary members of the IMACS TC1 international committee, the scientific committee, the reviewers, as well as the staff from SATIE (Université Cergy-Pontoise), the Instituto de Automática e Informática Industrial (Al2), Centro de Transferencia de Tecnología (CTT) and Centro de Formación Permanente (CFP) of the Universitat Politècnica de Valencia for their help in the organisation of the conference. We would like to thank the keynote speakers, tutorial presenters and special session organizers

for their fundamental contribution to the conference. Particularly, we would like to thank the president of the IMACS TC1 International Committee, Prof. Eric Monmasson, for his help and support for the organisation of ELECTRIMACS 2014.

We would like to thank the IMACS president Prof. Spitaleri and IMACS treasurer and MATCOM Chief Editor Prof. Beauwens for their long standing support of ELECTRIMACS, and for dedicating a special issue of the Elsevier MATCOM journal to ELECTRIMACS 2014.

We would like to thank our technical co-sponsors, the European Power Electronics and Drives Association (EPE), Joint Spanish Chapter of the IEEE Industrial Electronics Society and IEEE Power Electronics Society and the IEEE Industrial Electronics Society,.

We would also like to express our gratitude to our industrial sponsors and exhibitors (dSpace and OPAL-RT) for their contribution to the conference as the worldwide leaders in many important areas of interest of ELECTRIMACS.

Besides the organising universities, the help of our institutional sponsors has been very important to the success of ELECTRIMACS. We would like to thank our institutional sponsors, the Conselleria d'Educació, Cultura i Esport of the Generalitat Valenciana and, particularly, the help of the Solar Energy Research Center of Chile (SERC-Chile).

Last but not least, we would like to thank all the authors and attendees because the scientific success of ELECTRIMACS 2014 surely belongs to them.

Ilhem Slama-Belkhodja Ramón Blasco-Gimenez

ELECTRIMACS 2014 General Chairs

Organisers:

Universitat Politècnica de València Université de Tunis El Manar





#### **Technical Co-Sponsors**

IEEE Industrial Electronics Society European Power Electronics and Drives Association (EPE Association) IEEE IES-PELS Spanish Joint Chapter









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## **General Information**

#### Valencia

The city of Valencia is the capital of the 'Comunidad Valenciana' and of the province of Valencia. It is located in the middle-east of Spain, by the shore of the Mediterranean. The city is considered the third largest city of Spain, according to its population.

The Valencia province is surrounded by mountain ranges of about 1000 m high, whilst the coast land is almost completely flat, creating the typical Valencian landscape with mountains to the West and nice beaches and the "La Albufera" lake to the East and South of the city.

Valencia was founded by the Romans in 138 BC, and named "Valentia", which has remained up to the present day. Valencia has seen a variety of different cultures throughout its long history (Iberian, Roman, Visigoth, Arab and Christian), making the city an important centre of culture and finance. During the 15th and 16th centuries, Valencia became one of the great economic forces of the Mediterranean; this period is known as "Valencian Golden Century", which emphasizes its artistic splendour. Many monuments and buildings in the City Centre date from this period.

Since 1982 Valencia has been the capital of the Valencian Autonomous Region. Modern Valencia has a lot to offer, with a rich culture and cuisine and a vivid outdoor life. We recommend that all conference participants spend some relaxing moments enjoying the city of Valencia.

#### **Conference Venue**

Electrimacs 2014 will be held at the Universitat Politècnica de València, one of the largest Technical Universities in Spain, with more than 36,000 full time students 42 engineering degrees, and more than 2,000 full time research and academic staff.

#### Location

The conference will be held in the Ciudad Politécnica de la Innovación, located at the South-East corner of the Universitat Politècnica de València (corner between Avenida de los Naranjos and Ingeniero Fausto Elio). All conference halls are on the terrace of the 3rd floor of the large Ciudad Politécnica de la Innovación building (Building 8G), which can be accessed by using the panoramic glass elevators.



The main conference hall is located in the Blue Cube (Block N), with the parallel sessions being held in the Red Cube (Block J) and Yellow Cube (Block G).

Registration, Coffee breaks and Exhibition will be held in the hall of the Blue Cube (Block N).

GPS coordinates: 39.476734, -0.333572 39°28'36.2''N 0°20'00.9''W.

Address:

Ciudad Politécnica de la Investigación – Edifico 8B Universitat Politècnica de València 46022 Valencia (España)



#### Lunches

All lunches will take place in Restaurante Kube, located on the 4th Floor of Block L, just opposite to the main conference hall.

## **Travel Info**

#### **Travel to Valencia**

#### Travel by Plane

Valencia Airport is located very close to the city and can be reached by metro, bus services and, of course, taxi services (25-30€ to the city centre). Valencia Airport has direct flights to all major European hubs and cities.

#### Travel by Train

Valencia is linked to Madrid by high speed train. The journey from Madrid Atocha station to Valencia Joaquin Sorolla station takes less than two hours. Railway connections to Barcelona and Alicante are also excellent. For more information and for ticket purchase, please check the Spanish National Railway (RENFE) site www.renfe.es.

### 1 Getting around in Valencia

Valencia has an excellent metro, tram and bus network connecting the city and most of Valencia metropolitan area.

From the city centre to the conference site it takes around 30-35 minutes by public transportation and 15-20 minutes by taxi. The conference site is very close to the Serrería tram stop. From the city centre take underground line 3, change to line 4 or 6 at Benimaclet (tram) and get off at Serrería.

![](_page_9_Picture_9.jpeg)

From the "Ciudad de las Artes y las Ciencias" (Hotel Barceló, Hotel Acqua) area it takes 20-25 minutes by public transportation and around 7 minutes by taxi.

![](_page_10_Picture_1.jpeg)

#### Public transportation

Bus Lines 29 and 41 - stops 1898 Tarongers-Aparcament and 1918 Tarongers - Fausto Elio Line 1 - stop 1749 Luis Peixò - Comte Melito

http://www.emtvalencia.es/geoportal/?lang=en\_otp

Underground / Tram

http://www.metrovalencia.es/planificador.php?page=142

#### Electricity

Spain uses a 230V / 50 Hz network and European Plugs. Please make sure you bring the correct adaptors.

#### Weather

Weather in Valencia at the end of May is generally mild and sunny, with average temperatures of 21 °C with typical minimum and maximum temperatures of 16°C and 24 °C respectively, and humidity typically 65%.

In the last 30 years, Valencia had an average of 5 rainy days in May, with an average expected rainfall of 30 mm in May. So chances of rain are relatively low. Average sunlight hours per day have been 8.5 during May.

May weather is generally very nice for outdoor activities, being it at the seaside or in the city, although odd showers or colder days cannot be ruled out.

#### Registration

The registration desk will be placed in the hall of the Blue Cube (Block N). It will be opened the 19th of May from 14:30 to 17:00, the 20th and 21st of May from 8:30 to 13:00 and from 14:30 to 17:00 and the 22nd of May from 8:30 to 13:00.

#### **Tutorials**

Access to tutorials is free to all ELECTRIMACS 2014 participants. Please, do make sure you register for the tutorial so you ensure your seat and have access to materials and news.

#### **Presentation guidelines**

All ELECTRIMACS 2014 presentations are oral.

Every author presenting a paper is kindly requested to meet his/her session cochairs in the session room 20 minutes before the start of the scheduled session in order to upload his/her presentation in the computer. This rule should be strictly followed, especially for presentation in the main conference hall located in the Blue Cube (Block N).

The presenter must provide the session chairs or the technical assistant with a PowerPoint or PDF presentation on a USB pen drive. It is not possible for presenters to use their own portable computers.

A printed short bio of not more than 8 lines should also be handed to the session chairs, so speakers can be properly introduced.

The length of each presentation is restricted to 20 minutes, including questions. The authors are encouraged to conclude their oral presentation within 15 minutes (around 15-20 slides) and allow 5 minutes for questions and discussion.

No show papers will not be included in the proceedings nor be eligible for publication in the Special Issue of the Elsevier IMACS MATCOM journal.

#### Language

English will be the only language for both presentation and discussions during Electrimacs 2014.

#### **Session Chairs**

Session chairs have the responsibility to ensure that the schedule is strictly respected. Each presentation plus questions should not exceed 20 minutes.

In the event of "no-show", the session chair should wait 20 minutes for the next paper or close the session if it is the last paper.

The session chair will read the brief bio handed by the presenter to introduce the speaker before his or her presentation.

Each session chair is kindly requested to fill a form (one per session) with the evaluation of all papers in the session and hand it back to the registration desk or email it to electrimacs2014@upv.es.

All the rooms will be equipped with a video projector and a screen. A member of the conference technical staff will assist the session chairs for the duration of the complete session.

#### Internet access

Free wireless Internet access will be provided to all ELECTRIMACS 2014 participants. Please, do bring a laptop, tablet or smart phone with WiFi connection. An access code will be provided to the attendees when registering.

Alternatively, if your home institution is a member of eduroam, you should be able to connect to our eduroam wireless network directly.

Our IT technical staff will be available by the registration desk during the morning of the 20th to help you to connect to our wireless network should you experience any problem.

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![](_page_13_Picture_0.jpeg)

# The **program** at a Glance

Date	Time	Blue Cube (N)		
MONDAY	14:40-16:20	Registration		
19TH OF MAY	16:20-16:40			
Date	Time	Blue Cube (N)	Red Cube (J)	Yellow Cube (G)
	From 8:30	Registration/ Exhibition		
	8:40-9:00	Opening Ceremony		
	9:00-9:50	Keynote	1. Power Quality in Futu	ıre Grids
	10:00-11:00	TT1 - Electric Machines	SS2 - Microgrids / Smart Grids	TT1 - Photovoltaics
TUESDAY	11:00-11:20	Coffee Break - Blue Cube (N)		
	11:20-13:00	TT1 - Electromagnetic and Thermal Modeling	SS2 - Wind Energy	TT1 - Photovoltaics
	13:00-14:40	Lunch - Block L 4th Floor		
	14:40-16:20	SS4 - Modeling, Monitoring and Mitigation of Ageing in Industrial Systems	TT1 - Transportation	Tutorial 1 -PV and Wind Power output forecasting
	16:20-16:40	Cof	fee Break - Blue Cube	(N)
	16:40-18:40	SS1 - Analytical Models of Electrics Machines and Actuators	TT1 - Power Electronics and Control	Tutorial 1 -PV and Wind Power output forecasting
	20:00	\	WELCOME RECEPTION	

Date	Time	Blue Cube (N)	Red Cube (J)	Yellow Cube (G)
	From 8:30	Registration/ Exhibition		
	9:00-9:50	Keynote 2. Challenges on Microgrids and DC Homes		
	10:00-11:00	TT2 - Microgrids / Smart Grids	TT2 - Transportation	SS5 - Photovoltaics
	11:00-11:20	Coffee Break - Blue Cube (N)		
	11:20-13:00	TT2 - Microgrids / Smart Grids	TT1 - Transportation	TT1 - Drives
WEDNESDAY	13:00-14:40	Lunch - Block L 4th Floor		
21ST OF MAY	14:40-16:20	TT1 - Microgrids / Smart Grids	TT1 - Power Electronics	Tutorial 2 - PV Plant Modelling and Simulation
	16:20-16:40	Coffee Break - Blue Cube (N)		
	16:40-18:40	TT1 - High Power Converters	TT2 - Electric Machines and Actuators	Tutorial 2 - PV Plant Modelling and Simulation
	18:50	IMACS Technical Committee 1 Meeting SALA INNOVA (Green Cube-Block B- 4th Floor)		
	21:00		GALA DINNER	

Date	Time	Blue Cube (N)	Red Cube (J)	Yellow Cube (G)
	From 8:30	Registration/ Exhibition		
	9:00-9:50	Keynote 3. Advances in Multiphase Variable-Speed Drives		
Thursday 22nd of May	10:00-11:00	TT1 - Multiphase Machines and Fault Tolerant IM Drives	SS5 - Wind Energy	TT1 - Power Electronics
	11:00-11:20	Coffee Break - Blue Cube (N)		
	11:20-13:00	TT1 - Drives	TT1 - Energy Storage and Renewable Energy	TT1 -Real Time Simulation and Control
	13:00-14:40	CLC	SING CEREMONY - Iu	nch

## **Tutorials**

## Tutorial 1: PV and Wind Power output forecasting at 6-12-24 hours ahead

#### Prof. Sonia Leva

#### Tuesday 20th of May. 14:40-17:40 Yellow Cube (Block G)

The electricity produced by renewable energy sources (RES) is constantly increasing world-wide thanks to government policies and technological advancements. Europe has experienced one of the largest growths: in the last five years the electricity generation by photovoltaic (PV) and wind plants, has doubled. However the RESs energy production is characterized by fluctuating output.

Challenges of controlling and maintaining energy from inherently intermittent sources in grid-connected systems involves many features: efficiency, reliability, safety, stability of the grid and ability to forecast energy production. In particular, forecasting of PV and wind, as an estimation from expected power production, is very important to help the grid operators to better manage the electric balance between power demand and supply and to improve the penetration of distributed renewable energy sources and, in stand-alone hybrid systems, for the optimum sizing of all its components and to improve the reliability of the isolated systems. Additionally, in countries with a day-ahead electricity market, large power plants based on RES can act, as any other electricity producer, providing power generation sale offers (bids) to the market. In electricity markets, when power producers do not follow the scheduled bid they will face deviation penalties.

These technical and economic reasons driving the development of short-term power forecasting models for wind farms or for large grid-connected PV plants.

Several short-term power forecasting models related to wind and PV plants have been published. Existing solutions can be classified into physical, statistical and hybrid methods. Some works present models specifically dedicated to the hourly power generation forecasting in PV and wind plants. The most applied technique in these forecasting models is based on Artificial Neural Networks (ANNs) but some papers use simple physical methods.

The aim of the tutorial is:

- present a review of forecasting methods for short-term power of PV and WIND plants;

- introduce error definitions based on statistical theory and also on Authority or Regulation Agency;

- show some examples with reference to real plants considering very-short-term and short-term forecasting.

#### Biography of Prof. Sonia Leva

Prof. Sonia Leva was born in 1970 in Tradate (Italy). She received the M.Sc. degree in 1997, and the Ph.D. degree in 2001, both in Electrical Engineering, from the Faculty of Engineering, Politecnico di Milano, Italy. In 1998 she registered as Italian professional Engineer. From 1999 to 2010 she was Research Associate of Electrical Engineering at the Dept. of Electrical Engineering, Politecnico di Milano, Italy. In 2010 and 2012 she has been Visiting Professor at Tongji University, Shanghai.

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Since July 2010 Sonia Leva is qualified as Associate Professor, starting her professor activity on December 16, 2010. She is a senior member of the IEEE and a member of the IEEE Working Group "Distributed Resources: Modelling & Analysis" (General Systems Subcommittee, Transmission and Distribution Committee, IEEE Power and Energy Society) and of the Task Force "Modeling and Analysis of Electronically-Coupled Distributed Resource (DR) Systems" (General Systems Subcommittee, Transmission and Distribution Committee, Subcommittee, Transmission and Distributed Resource (DR) Systems" (General Systems Subcommittee, Transmission and Distribution Committee, Subcommittee, Transmission and Distribution Committee, IEEE Power and Energy Society).

Prof. Leva is member of the Italian Standard Authority (CEI) Technical Committee CT 82 "Sistemi di conversione fotovoltaica dell'energia solare (Photovoltaic Systems)" since 2008. She collaborated to write the second edition of the technical guide.

Her research interests include: electromagnetic compatibility, power quality, renewable energy and modelling and analysis of photovoltaic systems, RES (PV and Wind in particular) Power output forecasting at 6-12-24 hours ahead.

She is project manager of research groups with Politecnico di Milano and Private or Public Companies and head of the Solar Tech Lab at the Dept. of Energy, Politecnico di Milano (www.solartech.polimi.it).

## **Tutorials**

## Tutorial 2: Modelling and simulation of the operation of PV power generators

#### Prof. Seppo Valkealahti

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#### Wednesday 21st 14:40-17:40 Yellow Cube (Block G)

The focus of the tutorial will be in theoretical modelling and simulation of the operation of PV power generators under varying environmental conditions. Also experimental verifications of the used models and obtained simulation results will be presented.

Theoretical models to describe the electrical behaviour of PV cells and modules under varying radiation, temperature etc. environmental conditions will be introduced based on the physical properties of PV semiconductors and other PV generator components. The applicability of the widely used one diode model to model the electrical properties of PV cells and modules will be discussed. The limitations of the model will also be demonstrated by comparing simulation results to experiments. For example, the shortages of the model under low irradiance conditions will be demonstrated and the shortages and behaviour of input parameters, such as ideality factor and shunt resistance, will be discussed.

Then basic principles to simulate the operation of different electrical and spatial PV generator topologies will be discussed. Several environmental quantities influence simultaneously on the operation of PV generators and they have spatial and temporal variation within the area of the generator. How to approach and simulated the electrical operation of PV generators under these kind of conditions will be discussed. Some examples of recent scientific finding related to the behaviour of maximum power points and mismatch losses will be presented.

Then as a continuation and complement a state of the art dynamic thermalelectrical simulation model of the operation of PV generator under varying environmental condition will be presented. It can be used to simulate even the fastest environmental phenomena affecting to the electrical operation of PV generators. Its functionality will be demonstrated in example cases which are related to the experimental results of the TUT Solar PV power research plant. It includes a comprehensive climatic measurements system, where all environmental quantities affecting to the operation of the PV generator are measured with100 ms sampling frequency.

#### Biography of Prof. Seppo Valkealahti

Prof. Seppo Valkealahti was born in Alavus, Finland, 1955. He received the M.Sc. and Ph.D. degrees in physics from the University of Jyväskylä, Jyväskylä, Finland, in 1983 and 1987, respectively. From 1982 to 1997, he was a Teacher and Researcher of physics at the University of Jyväskylä, in the Riso National Laboratory in Denmark and in the Brookhaven National Laboratory in Upton (NY) in the USA.

From 1997 to 2004, he worked in ABB Corporate Research heading research and product development activities. In the beginning of 2004, he joined the Tampere University of Technology, Tampere, Finland, where he is currently a Professor in the Department of Electrical Energy Engineering. His research interests include electric power production and consumption-related technologies, solar energy, and multi-scientific problems related to power engineering.

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## **Plenary Sessions**

#### Plenary Session 1: Power quality in Future Grids

#### Dr Zelaya De La Parra, ABB Corporate Research, Vasteräs, Sweden Chair: Ramon Blasco-Gimenez

Tuesday 20th of May, 9:00-9:50. Blue Cube Conference Hal (Block N).

Future grids will be a mixture of different active and passive components that will need to interact in a coordinated fashion to maintain power quality. The number of active loads (e.g. EV Charging stations) will increase and components like StatCom, OLTC, VR will take care of voltage and frequency regulation with strict requirements on harmonics. The overall control strategies will need to accommodate for this new environment. The presentation will go through present and future components in the grid and their possible interaction.

#### Biography of Dr Zelaya De La Parra

Hector Zelaya De La Parra was born in Mexico City, Mexico, in 1953. He received the B.Sc.degree in electrical engineering from the Universidad Iberoamericana, Mexico City, in 1976, the M.Sc. degree from Loughborough University, Leicestershire, U.K., in 1981, and the Ph.D. degree from Bradford University, Bradford, U.K., in 1987.From 1989 to 1997, he was a member of the Power Electronics and Traction Systems Group, Birmingham University, Birmingham, U.K.

For the past 15 years, he has been with ABB Corporate Research,Västerås, Sweden, where he is currently a Senior Principal Scientist. His current research interests include power electronics, grid connected converters, switchedmode power supplies, motor drives, and control strategies. Dr. Hector Zelaya De La Parra is a Senior Member of the IEEE and a Registered Charter Engineer in the U.K.

## Plenary session 2: Future challenges on microgrids and DC homes

## Prof. Josep M Guerrero. Department of Energy Technology, Aalborg University, Aalborg East, Denmark

#### Chair: Ilhem Slama-Belkhodja

#### Wednesday 21st of May, 9:00-9:50. Blue Cube Conference Hall (Block N).

A microgrid is an electrical distribution network consisted of distributed generators, local loads, and energy storage systems that can operate in gridconnected or islanded modes. Different technologies are combined together, such us power converters, control, communications, optimization, and so on.

This way the energy can be generated and stored near to the consumption points, improving the stability and reducing the losses produced by the large power lines. In distributed energy systems like microgrids, multi-agent systems technologies will be presented distributed control is a powerful tool for distributed.

Previous experiences in the Danish electrical system like the Cell Controller project used these technologies to balance dispersed energy generation and consumption. Other examples of real sites including conventional islanded systems installed in islands and rural remote areas will be shown.

Finally, low-voltage distribution systems and DC microgrids for residential applications and homes will be introduced. New worldwide projects to develop technologies for low voltage DC distribution systems will be shown.

#### Biography of Prof. Josep M Guerrero

Josep M. Guerrero received the B.S. degree in telecommunications engineering, the M.S. degree in electronics engineering, and the Ph.D. degree in power electronics from the Technical University of Catalonia, Barcelona, in 1997, 2000 and 2003, respectively. He was an Associate Professor with the Department of Automatic Control Systems and Computer Engineering, Technical University of Catalonia, teaching courses on digital signal processing, field programmable gate arrays, microprocessors, and control of renewable energy. In 2004, he was responsible for the Renewable Energy Laboratory, Escola Industrial de Barcelona.

## **Plenary Sessions**

Since 2011, he has been a Full Professor with the Department of Energy Technology, Aalborg University, Aalborg East, Denmark, where he is responsible for the microgrid research program. From 2012 he is also a guest Professor at the Chinese Academy of Science and the Nanjing University of Aeronautics and Astronautics. His research interests is oriented to different microgrid aspects, including power electronics, distributed energy storage systems, hierarchical and cooperative control, energy management systems, and optimization of microgrids and islanded minigrids.

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Prof. Guerrero is an Associate Editor for the IEEE TRANSACTIONS ON POWER ELECTRONICS, the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, and the IEEE Industrial Electronics Magazine. He has been Guest Editor of the IEEE TRANSACTIONS ON POWER ELECTRONICS Special Issues: Power Electronics for Wind Energy Conversion and Power Electronics for Microgrids, and the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS Special Sections: Uninterruptible Power Supplies systems, Renewable Energy Systems, Distributed Generation and Microgrids, and Industrial Applications and Implementation Issues of the Kalman Filter. He is the past chair of the Renewable Energy Systems Technical Committee of the IEEE Industrial Electronics Society.

#### Plenary Session 3: Recent Advances in Multiphase Variable-Speed Drives

## Prof. Emil Levi, Liverpool John Moores University, Liverpool, United Kingdom

#### Chair: Eric Monmasson

Thursday 22nd of May, 9:00-9:50. Blue Cube Conference Hall (Block N).

Multiphase (more than three phases) machines are characterised with a number of advantageous features, which make them an ideal candidate for a range of applications, such as electric vehicles, locomotive traction, electric ship propulsion, 'more-electric' aircraft, and various high-power industrial processes.

At the heart of any variable-speed multiphase drive or generation system is a multiphase power electronic converter. The first part of this presentation will therefore concentrate on recent advances in the area of multilevel multiphase voltage source inverter PWM control. Two topologies will be addressed, a three-level supply in single-sided supply mode and dual two-level inverter supply with open-end stator winding configuration. Some of the recently developed carrier-based and space vector based PWM techniques will be surveyed and the achievable performance illustrated using experimental laboratory prototypes.

2:-

Multiphase machines are characterised with existence of additional degrees of freedom, since only two independently controllable currents are required for flux and torque control. In very recent times it has been shown that one of the potential uses of these additional degrees of freedom is for realisation of integrated on-board battery chargers for electric vehicles. The second part of the talk will therefore address topologies and control of multiphase converter/ propulsion motor powertrains, in relation to charging and vehicle-to-grid (V2G) operation. The emphasis will be placed on the nine-phase topology, which appears as the best candidate for future EVs, since exactly the same system suffices for both propulsion and charging/V2G modes of operation. Experimental results will again be included to validate the theoretical concepts.

One of the oldest uses of the additional degrees of freedom in multiphase machines is for post-fault operation, where loss of one or more phases can

## **Plenary Sessions**

be tolerated since the machine can still develop the rotating field. This is a topic of continuing interest at present, and some interesting very recent results will be reported in the last section of the presentation. These are related to fault-tolerant topologies and fault-tolerant control with an open phase, based on the use of a sixphase machine. A topology with two isolated neutral points and series connection of two-level three-phase inverters will be addressed first. Next, topology with two parallel-connected three-phase inverters will be examined in relation to the operation of the machine with a single and with two isolated neutral points.

#### Biography of Prof. Emil Levi

Emil Levi received the M.Sc. and Ph.D. degrees from the University of Belgrade, 24 Belgrade, Serbia, in 1986 and 1990, respectively. From 1982 to 1992, he was with the Department of Electrical Engineering, University of Novi Sad. In May 1992, he joined Liverpool John Moores University, Liverpool, U.K., where since September 2000, he has been a Professor of electric machines and drives.

Dr. Levi is an IEEE Fellow, serves as a Co-Editor-in-Chief of the IEEE TRANSACTION ON INDUSTRIAL ELECTRONICS, as an Editor of the IEEE TRANSACTION ON ENERGY CONVERSION, and as an Editor-in-Chief of the IET Electric Power Applications. He is the recipient of the Cyril Veinott award of the IEEE Power and Energy Society for 2009.

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## **Technical Program**

### Tuesday, 20th of May, Morning

#### Blue Cube (Block N)

#### TT1 - Electric Machines

Chairs: Georges Barakat, Yves Perriard

10:00	Analytical Study of Vibrations of Electromagnetic Origins in Short Permanent Magnet Synchronous Motors Guillaume Verez; Huguette Tiegna; Georges Barakat; Ouadie Bennouna; Ghaleb Hoblos; Yacine Amara
10:20	Influence of Discrete Inductance Curves on the Simulation of a Round Rotor Generator Using Coupled Circuit Method Jessy Mathault; Maxim Bergeron; Stephanie Rakotovololona; Jerome Cros; Philippe Viarouge
10:40	Linear Buckling Analysis Model for Continuously Transposed Conductors Using Mechanical FEA Daniel Geissler; Christian Geissler; Thomas Leibfried

#### Red Cube (Block J)

#### SS2- Microgrids / Smart Grids

Chairs: Josep Guerrero, Nicolas Retière

10:00	Design of a Bidirectional DC-DC Converter to Connect Supercapacitors and Batteries in Microgrid Applications Jose Carlos Alfonso Gil; Hector Beltran; Oriol Flors-Mas; Emilio Perez Soler; Carlos Ariño; J. Bergas-Jané
10:20	Sizing of a PV-Battery Back Up for an Intermittent Primary Energy Source Georges Salloum; Jawadi Khoury; R. Mbayed; Eric Monmasson
10:40	Model Predictive Control Based Inverters for Energy Storage Integration in Renewable Energy Microgrids. Felix Garcia; Carlos Bordons; Daniel Hidalgo; Carlos Merino

#### Yellow Cube (Block G)

#### TT1- Photovoltaics

Chairs: Sonia Leva, Giovanni Spagnuolo

10:00	Parameter Calculation of Photovoltaic Modules Using a Genetic Algorithm Giovanni Petrone; Juan Bastidas; Carlos Ramos-Paja; Giovanni Spagnuolo
10:20	Analysis and Validation of ANN PV Power Output Forecastingat 24 Hours Ahead Sonia Leva; Francesco Grimaccia; Marco Mussetta; E.G. Ogliari
10:40	Model Based Indicators To Quantify Photovoltaic Module Degradation Juan Bastidas; Edison Franco; Carlos Ramos-Paja; Giovanni Petrone; Giovanni Spag- nuolo

#### Blue Cube (Block N)

#### TT1- Electromagnetic and Thermal Modeling

Chairs: Jerome Cros, Sid-Ali Amamra

11:20	Thermal Slot Model for Mush Winding of Electrical Machine Mathieu Kirouac; Maxim Bergeron; Jerome Cros; Philippe Viarouge
11:40	Virtual Experimentation for Parameters Extraction Case Study of the Parasitic Capacitance in Wound Structures loav Ramos; Jean-Marc Dienot; Paul-Etienne Vidal; B. Nogarede; C. Viguier; E. Batista
12:00	Yokeless Radial Electrodynamic Bearing Corentin Dumont; Virginie Kluyskens; Bruno Dehez
12:20	Impedance Model for Position Estimation of Active Magnetic Bearings with a Self Sensing Approach Baptiste Chareyron; Olivier De-La-Barriere; Hamid Benahmed; Bruno Dehez; Erwan Salahun
12:40	<b>Thermal Modeling of an Asymmetrical Totally Enclosed Permanent Magnet</b> <b>Integrated Starter Generator</b> Radhouane Khlissa; Stephane Vivier; Guy Friedrich; Khadija El-Kadri-Benkara; Bassel Assaad

## **Technical Program**

### Tuesday, 20th of May, Morning

#### Red Cube (Block J)

#### SS2- Wind Energy

Chairs: Lionel Vido, Ilhem Slama-Belkhodja

11:20	Automatic Load Shedding Malfunction in High Wind Penetration Power Systems Nestor Aparicio; Salvador Añó-Villalba; Enrique Belenguer; Ramon Blasco-Gimenez
11:40	Influence of the Mix of Conventional Power Plants and Different Shares of Re- newable Power Supply on Frequency Stability Henning Zimmer; Georgia Papaioannou; Jutta Hanson
12:00	Variable Speed Wind Turbine Control Using a Robust Wind Torque Estimator Oscar Barambones
12:20	Implementation and Control of Hybrid Excitation Synchronous Generator Applied for Wind Application Karima Berkoune; Bensedrine Emna; Lionel Vido
12:40	<b>Direct Control Strategies of Wind Turbine System Based on Permanent Magnet</b> <b>Synchronous Generator</b> Wissem Naouar; Ikram Maaoui Ben Hassine; Najiba Mrabet-Bellaaj

#### Yellow Cube (Block G)

#### **TT1-** Photovoltaics

Chairs: Sonia Leva, Giovanni Petrone

11:20	Optimal Power Sharing Technique for Multi-Inverter Based PV Systems Mauro Di Monaco; C. Attaiese; M. D'Arpino; G. Tomasso
11:40	Role of Blocking Diodes in Photovoltaic Power Generation Systems Jorge Montealegre-Garcia; Joan Pons-Llinares; Jose Jorge Belda-Gisbert
12:00	Combined Photovoltaic Panel Simulator with Impedance Adjustment Lyuben Iliev; N. Panteleev; N. Mihailov
12:20	Models of Photovoltaic Cells Direct and Inverse Polarization, a Review Jose Jorge Belda-Gisbert; Jorge Montealegre-Garcia; Joan Pons-Llinares
12:40	Sliding Mode Control for Tracking Maximum Power Point in Buck-Boost Photo- voltaic System Abdelhakim Belkaid; Jean-Paul Gaubert; Ahmed Gherbi

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### Tuesday, 20th of May, Afternoon

#### Blue Cube (Block N)

SS4- Modeling, Monitoring and Mitigation of Ageing in Industrial Systems

Chairs: Pascal Maussion, Nicolas Patin

14:40	Advanced Electric Model of Aluminum Electrolytic Capacitor with Diffusive Element Romain Cousseau; Nicolas Patin; Eric Monmasson; Lahoucine Idkhajine
15:00	Capacitor Ageing Detection in Modular Multilevel Converter Miguel Moranchel Perez; Emilio Bueno; F.J. Rodríguez; Ines Sanz
15:20	<b>Regression Methods for Improved Lifespan Modeling of Low Voltage Machines</b> <b>Insulation</b> Pascal Maussion; S. Ursua; Antoine Picot; Manh-Quan Nguyen; Marie Chabert
15:40	Infrared Based Modelling of Induction Motors Application To Bearing Fault Diagnosis Maria Jose Picazo-Rodenas; R. Royo; Jose Antonino-Daviu; J. Roger-Folch
16:00	Practical Application of the New Ellipse Measuring Technique for EHV Transmis- sion Lines Protection Ali El-Rifaie; S.M. Moussa

#### Red Cube (Block J)

#### TT1- Transportation

Chairs: Johannes Paulides, Ilhem Slama-Belkhodja

14:40	<b>DFIM Drive for Dynamic Model Marine Propeller</b> Mustapha Debbou; Tahar Achour; Maria David
15:00	Fixed Order Robust H-Infinity Controller for 3-DOF Helicopter Alaa Chabir; Moussa Boukhnifer; Yassine Bouteraa; Jawhar Ghommam
15:20	Fixed Structure H-Infinity Loop Shaping Control of Switched Reluctance Motor for Electrical Vehicle Nadir Ouddah; Moussa Boukhnifer; Ahmed Chaibet; Eric Monmasson
15:40	Design and Development of Integrated PWM Electronics for Automotive Appli- cations Joon Sung Park; Jung-Moo Seo; Jin-Hong Kim; Bon-Gwan Gu; Jun-Hyuk Choi
16:00	Identification of Electrical and Mechanical Parameters of Dual Motors System Ibtissem Akacha Helal; Tahar Achour; Najiba Mrabet-Bellaaj; Maria David

## **Technical Program**

### Tuesday, 20th of May, Afternoon

#### Blue Cube (Block N)

#### SS1- Analytical Models of Electric Machines and Actuators

Chairs: Georges Barakat, Elena Lomonova

16:40	A Fast Semi-Analytical Model for the Slotted Structure of Induction Motors with 36-28 Stator-Rotor Slot Combination Ruud Sprangers; Johannes J.H. Paulides; B.L.J. Gysen; Elena Lomonova
17:00	Modelling and Analysis of Proximity Losses in Permanent Magnet Machines for More Electric Transportation Puvan Arumugam; Jiri Dusek; Michael Galea; Tahar Hamiti; Chris Gerada
17:20	Analytical 3-D Force Calculation of a Transverse Flux Machine Maarten Kremers; Johannes J.H. Paulides; J.L.G. Janssen; Elena Lomonova
17:40	<b>2D Analytical Torque Study of Slotless and Slotted Stator Topologies at High- Speed Operation</b> Bert Hannon; Peter Sergeant; Luc Dupre
18:00	Analytical-Numerical Modelling of Solid Rotor Induction Machine Luca Papini; Chris Gerada
18:20	<b>Comparison of Hybrid Analytical Modelling and Reluctance Network Modelling for</b> <b>Pre-Design Purposes</b> Yacine Amara; Sofiane Ouagued; Georges Barakat

#### Red Cube (Block J)

TT1- Power Electronics and Control

Chairs: Eric Monmasson, Rubén Peña

16:40	A Metaheuristic Approach for Controller and Anti-Windup Tuning of a Motion System with Flexible Transmission ACO Algorithm Vs Genetic Algorithm Maude Josee Blondin; Pierre Sicard
17:00	<b>Design and Fault-Operation Analysis of a Modular Cyclic-Cascade Intercell</b> <b>Transformer ICT for a Parallel X-Phase Converter</b> Sebastien Sanchez; Frederic Richardeau; Damien Risaletto
17:20	Verifying Some Characteristics of Load Voltage Control Method for Three-Pha- se-To-Single-Phase Matrix Converter System with Neutral Line Ryosuke Yamada; Naoki Yamamura; Muneaki Ishida
17:40	Harmonic Compensation and Power-Factor Correction Using Seven Level NPC Based Shunt Active Power Filter M. Haddad; L. Rmili; Salem Rahmani; Kamal Al-Haddad
18:00	Harmonic Analysis of Direct Digital Control of Voltage Inverters Manuel Arahal; Federico Barrero; M. G. Ortega

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### Wednesday, 21st of May, Morning

#### Blue Cube (Block N)

#### TT2- Microgrids / Smart Grids

Chairs: Josep Guerrero, Rosario Miceli

10:00	Fast Power Flow Scheduling and Sensitivity Analysis for Sizing a Microgrid with Storage Remy Rigo-Mariani; Bruno Sareni; Xavier Roboam
10:20	Agent-Based Distributed Hierarchical Control of DC Microgrid Systems Lexuan Meng; Tomislav Dragicevic; Josep Guerrero; Juan Vasquez
10:40	A Heuristic Load Management Approach for Domestic Appliances Fabrizio Milazzo; Eleonora Riva Sanseverino; Rosario Miceli

#### Red Cube (Block J)

#### **TT2-** Transportation

Chairs: Benoit Robyns, Xavier Roboam

10:00	Energy Management Multi-Criteria Design for Hybrid Railway Power Substa- tions Petronela Pankovits; Dhaker Abbes; Christophe Saudemont; Othman Moumniabdou; Julien Pouget; Benoit Robyns
10:20	Modelling of the Drive Train of Electric Vehicles with Interior Permanent Magnet Synchronous Machines Considering the Cross Saturation Effect Patrick Seibt; Linus Woerner; Christoph Schmuelling
10:40	<b>Optimization of Regenerative Braking Synchronization in Automatic Metro Lines</b> Jonathan Lesel; David Bourdon; Patrick Debay; Benoit Robyns

#### Yellow Cube (Block G)

#### SS5- Photovoltaics

Chairs: Seppo Valkealahti, Giovanni Spagnuolo

10:00	Comparative Study of Three Maximum Power Point Tracking Algorithms for Grid Connected PV Array Almoataz Abdelaziz; Hadi El-Helw; Basem Abdelhamed
10:20	Model-Based Maximum Power Tracking for Photovoltaic Systems Using Genetic Algorithms Slimane Hadji; Jean Paul Gaubert; Fateh Krim; Abdelhakim Belkaid
10:40	<b>Fuzzy Variable Step of PO MPPT with Direct Control Method Using Cuk Converter</b> Tawfik Radjai; L. Rahmani; Jean Paul Gaubert; S. Gassab

## **Technical Program**

### Wednesday, 21st of May, Morning

#### Blue Cube (Block N)

#### TT2 - Microgrids / Smart Grids

Chairs: Josep Guerrero, Eleonora Riva Sanseverino

11:20	Effect of Interleaving Buck Converters on the Stability of a DC Network Nicolas Roux; Eric Bru; Binhnguyen Nguyen; J.M. Blaquiere
11:40	A New Discrete-Time Modelling of PWM Converters for Stability Analysis of DC Microgrid Mehdi Karbalaye Zadeh; Roghayeh Gavagsazghoachani; Jean-Philippe Martin; Serge Pierfederici; Babak Nahidmobarakeh; Marta Molinas
12:00	Dynamic Equivalent of Power Systems Based on Scale Invariance for Smart Grid Simulation Nicolas Retiere; Thi-Tinh-Minh Le
12:20	<b>Optimization of Fuzzy Supervisor for Electric Vehicle Load in Distribution Grid</b> Anouar Bouallaga; Arnaud Davigny; Asma Merdassi; Vincent Courtecuisse; Benoit Robyns
12:40	Smart Grids for Energy Consumptions Optimization Rosario Miceli; Giovanni Cipriani; Diego Lacascia; Eleonora Riva Sanseverino

#### Red Cube (Block J)

#### TT1- Transportation

Chairs: Benoit Robyns, Xavier Roboam

11:20	Multilevel Integrated Optimal Design for Power Systems of More Electrical Aircraft Houdhayfa Ounis; Bruno Sareni; Xavier Roboam
11:40	Impact of the Mechanical Limitations of an Automatic Subway on the Energy Consumption and the Running Time Estimations Clement Mayet; Philippe Delarue; Alain Bouscayrol; Jean-Noel Verhille; Eric Chattot
12:00	Modelling and Analysis of an Original Direct Hybridization of Fuel Cells And Ultracapacitors Christophe Turpin; D. Van Laethem; B. Morin; O. Rallieres; Xavier Roboam; Olivier Verdu
12:20	Energy Management of Fuel Cell-Battery Hybrid Electric Vehicle Basedon Fre- quency Separation Experimental Results Using a Fuel Cell Emulator Hamza Alloui; Khoudir Marouani; Mohamed Becherif; M.N. Sid
12:40	Hierarchical Management Structure of a Battery Supercapacitor System for EV Using Energetic Macroscopic Representation Joao Pedro Trovao; Alain Bouscayrol; Felipe Machado; Walter Lhomme

#### Yellow Cube (Block G)

#### TT1- Drives

Chairs: Rubén Peña, Georges Salloum

11:20	<b>Power Capability Study of a Cascaded Doubly Fed Induction Machine</b> Georges Salloum; Maria Elachkar; R. Mbayed; Nicolas Patin; Sandrine Le Ballois; Eric Monmasson
11:40	Reactive Power Control of Grid-Connected Brushless Doubly-Fed Reluctance Wind Generators Sul Ademi; Milutin Jovanovic
12:00	Encoder Faults Signatures in PMSM Drives Using Discrete Wavelet Transform Manef Bourogaoui; Houda Ben Attia Sethom
12:20	Influence of Grid Parameter Variation on DFIM Pump Turbine System Operation Amel Damdoum; Maria David; Ilhem Slama-Belkhodja

## **Technical Program**

### Wednesday, 21st of May, Afternoon

#### Blue Cube (Block N)

#### TT1- Microgrids / Smart Grids

Chairs: Bruno Sareni, Ilhem Slama-Belkhodja

14:40	Power Management of an Off-Grid Hybrid PV-Wind Battery System Including Electrical and Hydraulic Loads Malek Zaibi: Gerard Champenois: Yavier Roboam: Jamel Belbadi: Bruno Sareni
15:00	Energy Management of a Hybrid System Based on a Fuel Cell and a Battery Amine Jaafar; Christophe Turpin; Xavier Roboam; Eric Bru; Olivier Rallieres
15:20	Dynamic Frequency Controlling for Isolated Island Power Systems Georgia Papaioannou; Marco Fleckenstein; Jutta Hanson; Henning Zimmer
15:40	Hybrid Islanding Detection Method by Using Grid Impedance Estimation in Parallel-Inverters-Based Microgrid Walid Ghzaiel; Manel Jebali-Ben Ghorbal; Ilhem Slama-Belkhodja; Josep Guerrero
16:00	LCL Filter Design for Three-Phase Grid-Connected Converters Marwa Ben Said Rmodhane; Wissem Naouar; Ilhem Slama-Belkhodja; Eric Monmasson

Red Cube (Block J)

#### **TT1-** Power Electronics

Chairs: Pascal Maussion, Federico Barrero

14:40	Study of the Current Ripple of a Modular DAB DC-DC Converter with Interleaving Javier Guacaneme; Gabriel Garcera; Emilio Figueres; R. González-Medina
15:00	Modeling and Parameter Identification of a Multi-Phase Induction Heating Sys- tems Pascal Maussion; Kienlong Nguyen; Stephane Caux; Philippe Teixeira; Olivier Pateau
15:20	<b>Discrete-Time Modeling of a Constant Power Load Supplied by Power Electronic</b> <b>Converter</b> Louis-Marie Saublet; Roghayeh Gavagsazghoachani; Serge Pierfederici; Jean-Philippe Martin; Babak Nahidmobarakeh
15:40	Optimal Efficiency Optimization Through Power-Sharing for Paralleled DC-AC Inverter with Parameters Estimator Ahmed Shahin; Hassan Moussa; Azeddine Houari; Jean-Philippe Martin; Babak Nahid- mobarakeh; Serge Pierfederici
16:00	<b>Comparative Study on Control Schemes for Half Bridge Series Resonant Converter</b> Hamed Belloumi; Ferid Kourda

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#### Blue Cube (Block N)

#### TT1- High Power Converters

Chairs: Bruno François, Rubén Peña

16:40	Fault Tolerant Control for Hybrid 4 Leg NPC-Flying Capacitors Topology Hafedh Ben Abdelghani; Afef Bennani Ben Abdelghani; Frederic Richardeau
17:00	New Proposal of Switching Strategies for Loss Balancing in ANPC Converters Ines Sanz; Emilio Bueno; F.J. Rodríguez; Miguel Moranchel Perez
17:20	Simplified Model for Modular Multi-Level Converter Simulation Ricardo Vidal; Enrique Belenguer; Hector Beltran; Ramon Blasco-Gimenez
17:40	A Multilevel Modular DC-DC Converter Topology Cristian Pesce; Ruben Pena; Diego Soto; J. Riedemann; Ramon Blasco-Gimenez
18:00	New Pulse Width Modulation Approach and Model Applied to Multilevel Inver- ters Karima Berkoune; Paul-Etienne Vidal; F. Rotella
18:20	Selective Harmonic Elimination of Six-Level Inverter Using PHM Technique Sid-Ali Amamra; Kamal Meghriche; Abderrezzak Cherifi; Bruno Francois

Red Cube (Block J)

#### **TT2- Electric Machines and Actuators**

Chairs: Jerome Cros, Lionel Vido

16:40	Effect of Stator Slot Openings in Axial Flux Permanent Magnet Machines Peter Sergeant; Hendrik Vansompel; Luc Dupre
17:00	<b>High Speed PM Machine Design and Optimal Sizing for Embedded Applications</b> Hibat Allah Bouker; Lionel Vido; Hamid Benahmed
17:20	A New Theoretical Approach To Model Transient Behavior of Linear Induction Motors Using Magnetic Equivalent Circuit Models Linus Worner; Patrick Seibt
17:40	Modelling of Beam Excited by Piezoelectric Actuators in View of Tactile Appli- cations Clement Nadal; Christophe Giraud-Audine; Frederic Giraud; Michel Amberg; Betty Semail
18:00	Study of Efficiency in 15-kW Three-Phase Induction Motor with Aluminum and Copper Rotors Sunil Kedia; Vinila Chavan; Himansho Mittal; Atul Daga; Manglesh Dixit
18:20	Fast Iron Losses Model Taking Into Account the Control Laws for the Optimal Sizing of IPMSM Sulivan Kuttler; K. El-Kadri Benkara; G. Friedrich; F. Vangraefschcpe; A. Abdelli

## **Technical Program**

### Thursday, 22nd of May, Morning

#### Blue Cube (Block N)

#### TT1- Multiphase Machines and Fault Tolerant Control of IM Drives

Chairs: Emil Levi, Teresa Orlowska-Kowalska

10:00	Closed Loop Control for Four-Level Five-Phase Open-End Winding Drive with Unequal DC-Link Voltages Martin Jones; Milan Darijevic
10:20	A Comparison Between FOC and DTC Methods for Five-Phase Induction Motor Drives Ramsha Karampuri; Joel Prieto; Federico Barrero; Sachin Jain
10:40	Low-Cost Control Technique for Fault-Tolerant Induction Motor Drive Piotr Sobanski; Teresa Orlowska-Kowalska

### 36 Red Cube (Block J)

#### SS5 - Wind Energy

Chairs: Ilhem Slama-Belkhodja, Milan Prodanovic

10:00	<b>Dynamic Modelling of PMSM - Wind Turbines for Power Network Integration</b> Francisco Huerta Sanchez; Milan Prodanovic; Pablo Matatagui
10:20	Wind Power Plant Integration in HVDC Grids with Voltage Droop Control Salvador Añó-Villalba; Ramon Blasco-Gimenez; Soledad Bernal-Pérez; Enrique Belen- guer
10:40	Simple Fuel Cell Model for Stand-Alone Hybrid System Energy Management Safa Slouma; Sondes Skander; Ilhem Slama-Belkhodja; M. Orabi

#### Yellow Cube (Block G)

#### **TT1-** Power Electronics

Chairs: Serge Pierfederici, Rubén Peña

10:00	Hysteretic Control of Grid-Side Current for a Single-Phase LCL Grid-Connected VSC Santiago Cobreces; Robert Grino
10:20	A New Converter Open Circuit Fault Diagnosis Based on Current Shape Factor with Adaptive Threshold Ahlem Ben Youssef; Sejir Khojet El Khil
10:40	Average Current Mode Control of a Dual Active Bridge Converter Javier Guacaneme; Gabriel Garcera; Emilio Figueres; I. Patrao

#### Blue Cube (Block N)

#### TT1 - Drives

Chairs: Hoang Le-Huy, Martin Jones

11:20	A New Method for Multiple Open-Circuit Faults Diagnosis in Back-To-Back Converter of PMSG Drives for Wind Turbine Applications Imed Jlassi; Sejir Khojet El Khil; Najiba Mrabet-Bellaaj
11:40	Modulation Strategies for an Open-End Winding Induction Machine Fed by a Two-Output Indirect Matrix Converter Javier Riedemann; Ruben Pena; Roberto Cardenas; Jon Clare; Pat Wheeler; Ramon Blasco-Gimenez
12:00	Adaptive Reference Model Direct Torque Fuzzy Control of Switched Reluctance Motors Sofiane Fahas; Hoang Le-Huy; Kamwa Innocent
12:20	<b>Power Flow Modelling Based Electric Drive Control Optimization</b> Gert-Helge Geitner; G. Komurgoz
12:40	DTC for Matrix Converters with Improved Switching Losses Behaviour Thomas Schulte; Guenter Schroeder

## **Technical Program**

### Thursday, 22nd of May, Morning

#### Red Cube (Block J)

#### TT1- Energy Storage and Renewable Energy

Chairs: Xavier Roboam, Federico Barrero

11:20	Fuzzy Logic Based Power Management for Reverse Osmosis Desalination Pro- cess Fed by Intermittent Hybrid Renewable Source Ines Ben Ali; Mehdi Turki; Jamel Belhadj; Xavier Roboam
11:40	<b>Model Predictive Control Based Current Source Converter for Minimizing Degra- dation Aspects in Fuel Cell Applications.</b> Felix Garcia
12:00	Fault Diagnosis and Identification of Proton Exchange Membrane Fuel Cell Using Electrochemical Impedance Spectroscopy Classification Elodie Pahon; Latifa Oukhellou; Fabien Harel; Samir Jemei; Daniel Hissel
12:20	ANOVA Method Applied To PEMFC Ageing Forecasting Using an Echo State Network Simon Morando; Samir Jemei; Rafael Gouriveau; Daniel Hissel; Noureddine Zerhouni
12:40	Analysis and Control of an Interleaved Buck-Boost Converter Combined with a Grid Connected VSC for BESS Applications Alvar Mayor; Andres Agudo; Ines Sanz; Emilio Bueno; Francisco Manuel Sanchez Gomez

#### Yellow Cube (Block G)

#### TT1- Real Time Simulation and Control

Chairs: Christian Dufour, Eric Monmasson

11:20	FPGA-Based Approach for the Parallelization of a Predictive Current Controller Algorithm Osmell Machado; Pedro Martin; F.J. Rodríguez; Emilio Bueno; Francisco Manuel San- chez Gomez
11:40	<b>Design, Modeling and FPGA-Based Speed Control of a 2-Phase Axial Flux Perma- nent Magnet Synchronous PCB Motor</b> Yuri Coia; Lahoucine Idkhajine; Eric Monmasson; F. Marignetti
12:00	Virtual Platform for Reliable FPGA Implementation of Power Electronics Algorithms Francisco Manuel Sanchez Gomez; R. Mateos; Emilio Bueno; A. Hernández; J. Mingo
12:20	An Induction Machine and Power Electronic Test System on FPGA Christian Dufour; Sebastien Cense; Jean Belamger
12:40	Real Time Simulation and Experimental Validation of Active Power Filter Opera- tion And Control S. Ktata; Salem Rahmani; H. Vahedi; Kamal Al-Haddad

### SOCIAL EVENTS

### Welcome reception Tuesday, 20th of May , 20h Hotel Astoria Palace Plaça de Rodrigo Botet, 5 Valencia http://www.ayrehoteles.com/en/ hotel-astoria-palace/

![](_page_38_Picture_2.jpeg)

## Gala Dinner Wednesday, 21st of May, 21h L'Alqueria del Pi Camino Viejo de Godella, 55 Valencia http://www.alqueriadelpi.com/en/

A bus service will be scheduled for the Gala Dinner.

### **IMACS TC1 Commitee Meeting**

The meeting of the IMACS TC1 (Electrimacs Committee) will be held Wednesday, 21st of May at 18:50 in the SALA INNOVA meeting room (Green Cube, block B, 4th floor)

![](_page_38_Picture_7.jpeg)

### LIST OF CONTRIBUTORS

#### Α

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#### В

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