

CONFERENCE ADDRESS

Mari Moran
PESC '00 Secretariat
Power Electronics Research Centre
National University of Ireland, Galway
Galway
IRELAND
Phone: +353-91-524 411 ext. 3372
Fax: +353-91-750 588
E-mail: pesc00@nuigalway.ie
Web: <http://pesc00.nuigalway.ie>

**31ST IEEE POWER ELECTRONICS
SPECIALISTS CONFERENCE****18-23 JUNE, 2000****POWER ELECTRONICS RESEARCH CENTRE
NATIONAL UNIVERSITY OF IRELAND, GALWAY
IRELAND****SPONSORED BY****THE IEEE POWER ELECTRONICS SOCIETY****EVENT SPONSORS****APC
ANALOG DEVICES
ARTESYN TECHNOLOGIES
CONVERTEC LTD.
PEI TECHNOLOGIES**

WELCOME TO GALWAY

Ceád míle fáilte - one hundred thousand welcomes to Galway and the 31st IEEE Power Electronics Specialists Conference sponsored by the IEEE Power Electronics Society. The first PESC Conference of the new millennium combines the old and the new - the historical city of Galway plays host to engineers and researchers from industry and academia to discuss future developments in power electronics.

The Power Electronics Specialists Conference is an annual event, which is held in Europe every four years. PESC provides a forum where new concepts and ideas are discussed, with contributions from industry, academia and government. Contributions from young engineers and researchers are particularly welcome.

The Conference will be based on the campus of National University of Ireland, Galway, which was founded in 1845. Christopher Columbus visited the city in 1477, fifteen years before he discovered America. The modern campus boasts excellent conference facilities on the banks of the River Corrib. The campus is a short walk from a bustling downtown area.

Galway is a thriving city renowned for its friendliness and young population. The strategic location of the city on the west coast gives visitors easy access to the surrounding beauty spots such as Connemara and Ashford Castle.

A record number of 596 digests were received for PESC '00. The Program Committee selected 264 papers from 37 countries for presentation at the conference. The large number of papers prompted an additional parallel session in the program to cater to the demand. Each digest received 4 reviews from an army of 183 reviewers. We would like to thank the topic chairs and all the reviewers for their invaluable assistance in this huge task. The plenary session has 3 papers on such diverse topics as power electronics road map, automotive electronics, and packaging. Four tutorials cover DSP techniques in motor drives, low-voltage power conversion, building blocks for power electronics, and three-phase PWM rectifier systems. Three rap sessions are scheduled on the topics of power quality, computer aided design and packaging

We would like to thank the Event Sponsors: APC, Artesyn Technologies, Analog Devices, Convertec and PEI Technologies for their support.

We look forward to seeing you in Galway at PESC '00.

W. G. Hurley
General Chair

Joe Madden
Technical Program Chair

PESC '00 ORGANIZING COMMITTEE

General Chair	W. Gerard Hurley NUI, Galway
Program Chair	Joe Madden PEI Technologies
Program Co-Chair	Arthur Kelley North Carolina State Univ.
Finance Chair	Noel Barry Cork Inst. of Technology
Finance Co-Chair	William M. Portnoy Texas Tech. University
Publications Chair	Thomas Habetler Georgia Inst. of Technology
Publicity Chair	Máire Mhic Uidhir NUI, Galway
Tutorials Chair	Mike Egan University College, Cork
Tutorials Co-Chair	Jon Clare The Univ. of Nottingham
Rap Sessions Chair	Cian O'Mathúna University College, Cork
Rap Sessions Co-Chair	Seth Sanders Univ. California, Berkeley
Arrangements Chair	Ann Duggan NUI, Galway
Guest Program Chair	Kathleen Hurley c/o NUI, Galway
Registration Chair	Jill Leonard PEI Technologies
Asia Liaison Chair	Dean Patterson Northern Territory Univ.
U.S.A. Administration	Robert Myers Myers/Smith, Inc.
Technical Program Coordinator	Mari Moran NUI, Galway
Webmaster	John Breslin NUI, Galway

TECHNICAL PROGRAM COMMITTEE

Chair	Joe Madden PEI Technologies
Program Co-Chair	Arthur Kelley North Carolina State Univ.

Topic Chairs

David Hamill
University of Surrey

Bill Dunford
Univ. of British Columbia

John Murphy
University College, Cork

Randy Frank
Motorola, Inc.

Johan H.R. Enslin
KEMA

William M. Portnoy
Texas Tech. University

Braham Ferreira
Tech. Univ. of Delft

Jaime Arau
CENIDET

José Cobos
Univ. Politec. Madrid

J. Daan van Wyk
Virginia Polytechnic

REGISTRATION INFORMATION

Advance registration discounts are available if your form is received by April 14, 2000. The advance fees are IR£325 for IEEE members, £395 for non-members, £90 for Life Members, and £90 for students with valid ID. After April 14, the fees are £360 for members, £450 for non-members, and £110 for Life Members and students. Full registration includes admittance to all technical and rap sessions, printed and CD-ROM copies of the Proceedings, the Welcome Reception, Wednesday Afternoon Tour, the Conference Banquet, the Concert at St. Nicholas' Collegiate Church, and the Awards Luncheon. Reduced rate and student registrations include the CD-ROM Proceedings, Welcome Reception, Wednesday Tour, Concert and the Awards Luncheon, but not the Conference Banquet. Awards Luncheon and Banquet Tickets, and additional printed and CD-ROM versions of the Proceedings will be available for purchase at the conference.

Spouses do not require a registration fee, and may attend technical sessions, rap sessions, the Welcome Reception and the Concert as guests of the Conference. Extra tickets for the Tours, Banquet (£40 each) and Awards Luncheon (£15 each) can be purchased for guests. Children of conference registrants and guests are required to have tickets to attend the Tours, Wednesday Evening Banquet or Friday Awards Luncheon, subject to availability.

The Tutorial Sessions are available to all registrants for a supplemental fee. The advance registration fees are £60 for members, £80 for non-members, and £40 for Life Members and students. After April 14, the fees are £75 for members, £100 for non-members, and £50 for Life Members and students. The tutorial fee covers admission to one session and a workbook. Each tutorial must be registered for separately. Additional workbooks will be on sale at the conference.

Visa, Mastercard, bank transfers, and bank drafts are acceptable as payment. The **conference registration form** should be sent with full payment and with all items completed. For additional forms or conference information visit the conference website at <http://pesc00.nuigalway.ie> or contact:

PESC '00 Registration,
Miriam Byrne, PEI Technologies,
Enterprise Ireland, Glasnevin,
Dublin 9, IRELAND.
Phone: +353-1-808 2478
Fax: +353-1-837 2411
E-mail: byrnem@pei-tech.ie

REGISTRATION DESK

The registration desk is located in Room 203 on the main Concourse area of the Arts/Science Building in the National University of Ireland, Galway. Tutorial registration is open from 16:00 to 18:00 on Saturday, 8:00 to 9:00 and 13:00 to 14:00 on Sunday. Conference registration is open from 15:00 to 19:00 on Sunday, 8:00 to 16:00 Monday through Thursday, and 8:00 to 12:00 on Friday.

CANCELLATIONS AND REFUNDS

Notification of cancellation should be sent in writing to Miriam Byrne at PESC '00 Registration. For cancellations received before May 18, 2000 the registration fee will be returned minus an administration fee of IR£50. No refunds can be made for cancellations received after May 18, 2000.

ACCOMMODATION INFORMATION

Accommodation must be booked before April 14, 2000. Accommodation cannot be guaranteed after the April 14, 2000 deadline.

CORRIB VILLAGE

Accommodation will be provided at Corrib Village on the University Campus. There are 240 rooms with private bathrooms, additional rooms have shared bathroom facilities. The price for single occupancy of en-suite bedroom is IR£27 per

night, and for double occupancy £49 per night. For a standard bedroom, the single occupancy cost is £24.50 per night, and double occupancy cost is £40 per night. All these prices include breakfast. The Corrib Village is 600 meters from the Concourse (Conference Site).

Check in time is between 16:00 and 20:00 and check out time is before 10:00 in the morning. Linens and towels are provided. All of the en-suite bedrooms have direct dial telephone and TV. A number of apartments in Corrib Village are specifically adapted for disabled persons. On-site facilities include 24-hour reception, launderette, shop, restaurant and tennis courts.

Additional information is available from Corrib Village at +353-91-750 394 (Tel) or +353-91-750 512 (Fax) and ask for Ms. Patricia Walsh. E-mail a.duggan@mis.nuigalway.ie. Fill in the **accommodation registration form** and send it to the address provided on the form with payment, before April 14, 2000.

HOTELS

A number of rooms for PESC '00 registrants have been booked in City Centre 4 Star and 3 Star hotels with special prices. A single room in a 4 Star hotel will cost IR£120 per night, and a double or twin room £125 per night. In a 3 Star hotel, a single room costs £75 per night and a double or twin room £88 per night. You can avail of these prices by filling in the **accommodation registration form** and sending it to the address provided on the form with payment, before April 14, 2000.

Additional information and accommodation registration forms are available on the conference website at <http://pesc00.nuigalway.ie>.

SITE INFORMATION

PESC '00 will be held in the National University of Ireland, Galway (NUI, Galway), in the west of Ireland. The University is situated on the banks of the river Corrib, on one of the most attractive university sites in Europe. The original mid-nineteenth century University buildings are in a Tudor architectural style. The old stone quadrangle at the heart of the University is flanked by numerous new buildings, reflecting the steady growth, in quality, and in sheer numbers, of the University.

Playing fields, tennis courts, a running track, an indoor athletic centre, the University's teaching hospital, its library, an inter-denominational Church, research laboratories, lecture halls, academic offices and a student residence village all combine to form a compact, scenic campus close to Galway city centre.

Galway Bay and the Atlantic beyond are the breathtaking backdrop for one of Ireland's foremost centres of academic excellence.

SERVICES

There is a banking service available in the Conference Concourse with foreign exchange facilities. A travel office is located in the library basement. There is also a newsagent and a bookshop in the basement. A post office is located just opposite the main gates of the University on Newcastle Road. Photocopying and fax services will be available on a cash basis in the University Secretariat at the Concourse.

Lunches and refreshments are served on a cash basis in the main restaurant. There is also a fully licensed Bar on the campus.

CAR PARKING

There is ample car parking available at Corrib Village and at the University.

CLIMATE

The average daily temperature in June is 15 °C (59 °F), but this can be as low as 12°C (54 °F) or as high as 25 °C (77 °F). There is always the possibility of a rain shower, so we advise you to bring an umbrella or light raincoat.

LANGUAGE

The working language of the Conference will be English.

MESSAGE DESK AND INTERNET

A message desk will be located in the registration area for the duration of the Conference. The message desk can be reached at +353-91-750 480 or +353-91-524 411 ext. 2799. Personal computer terminals will be available to PESC delegates for accessing the Internet and sending and receiving e-mail messages.

SALES TAX REFUNDS

The price of most goods includes value-added tax (VAT). Non-EU visitors can have this sales tax refunded at the end of their trip. Be sure to ask for a tax-free shopping form with each purchase and follow the instructions for completion.

TELEPHONES

Public telephones are available in Corrib Village and in the Conference Concourse area. The telephones take either coins or call cards, which can be purchased at the Students' Union Shop beside the main Restaurant and at Corrib Village Reception. There are credit card phones in the Concourse area. The international access code is 00 + country code, etc.

VISAS

Visitors' visas are not required for visitors from North America, Europe or Japan. For other countries, please check with your local embassy for details.

TRAVEL INFORMATION

Extensive travel information and links are available on the conference website at <http://pesc00.nuigalway.ie>.

Aer Lingus is the official carrier for PESC '00. To book, delegates can contact the Aer Lingus offices listed on the website, and quote the name of the conference as being PESC '00 and the following reference number - **EISE014**.

ARRIVING AT DUBLIN AIRPORT

Travelling from Dublin to Galway by Air

For travel by air onwards to Galway, proceed to the Transfer Desk for further instructions. Flights from Dublin depart at 12:40, 15:10 and 22:00 (except no evening flight on Saturday). Flight time is 50 minutes. Take a taxi to Corrib Village or to your hotel. The charge is approximately £11.

Travelling from Dublin to Galway by Train

For travel to Galway by train, take a bus to Heuston Railway Station. Trains for Galway depart weekdays at 7:20, 11:00, 14:25, 17:00, and 18:55, on Sundays at 9:10, 14:15, 18:50, and 20:40. Travel time to Galway is approximately 2 1/2 hrs. The train fare for return ticket is £22.00 if travelling on Monday to Thursday or Saturday and £26.00 if travelling on Friday or Sunday. The charge for a taxi from the railway station to the Corrib Village is approximately £5.00.

Travelling from Dublin to Galway by Bus

Bus Eireann runs an hourly bus service between Dublin and Galway. Buses leave Dublin on the hour from 8:00 until 20:00. You need to take bus or taxi to the main bus station Busáras in Dublin City centre. Travel time is approximately 3.5 hours and the cost of a return ticket is £11.

City Link and Nestor Bus both offer bus services direct from Dublin airport to Galway. City Link buses leave from Monday to Saturday at 12:15, 13:15, 15:15, 16:45, and 18:45. On Sundays the departure times are 10:15, 12:15, 15:15 and 16:45. Nestor buses leave airport at 13:00, 16:30, 17:30, 18:30 and 21:30 Monday to Saturday, 13:00, 16:30, 17:30 and 21:30 on Sunday. Travel time is approximately 4 hours and the cost of a return ticket is £12.

ARRIVING AT SHANNON AIRPORT

Travelling from Shannon to Galway by Bus

Buses depart Shannon Airport on Monday to Saturday at 9:35, 11:15, 13:15, 15:05 (not on Saturday), and 17:30. On Sunday the departure times are 10:10, 11:15, 14:10, 16:05, and 18:05. Travel time to Galway is approximately 1 1/2 hours. All buses require a change at Ennis. Bus fare is £14.00 return.

TRAVELLING TO GALWAY BY ROAD

The main approach roads are shown on the location maps. The approach to the University will be signposted on black and yellow AA signs.

Dublin is 135 miles (217 kilometres) and Shannon is 55 miles (89 kilometres) from Galway.

AUTHOR SERVICES

Paper presenters should plan to attend the Author's Breakfast in the main restaurant on the campus, beginning at 7:30 on the day of their session. At this breakfast, Session Chairs will gather biographical information, and final arrangements for sessions will be discussed. Each session room will be equipped with an overhead projector, 35-mm slide projector, screen, and pointer. A computer-operated overhead display unit can be reserved with advance notice. If you have special audio-visual requirements, please contact the PESC '00 Secretariat as soon as possible. An extra charge might be involved if highly specialized equipment is required.

A presenter's preparation room will be available during registration hours Monday through Friday in Room 203. Slide carousels will be available for checkout.

GUEST SERVICES

A Guest Lounge will be provided (look for the sign at the registration desk), with light refreshments morning and afternoon. A special **Welcome to Galway, Coffee Morning** will be arranged on Monday at 9:30 with video presentation of Galway and set dancing lessons.

GUEST TOURS

Space is limited on the tours so advance booking is recommended, see the **conference registration form**. All tours depart from the Archway of the Quadrangle. Guests should assemble at the departure point 15 minutes before tour begins.

Monday, June 19, 2000 - 14:00-17:00

Galway City Bus Tour Including a Visit to Galway Irish Crystal

Cost £20 per person. Includes round-trip transportation, entrance fee and refreshments.

This tour is accompanied by a professional guide and is an ideal opportunity to become familiar with the history and geography of the city. The route will take us to Salthill along the promenade overlooking Galway Bay past the site of the Old Claddagh Village and the Spanish Arch. We will visit Galway Irish Crystal, this Georgian style building houses a sweeping staircase and magnificent chandelier, a great hall, an interpretative centre with a traditional boat building and a Claddagh Village exhibit and showroom. Here you will learn about the craft process and see master craftsmen cutting, engraving and creating various designs on crystal. Refreshments

will be served before we depart Galway Crystal. En route back to the University, the tour will take you past Eyre Square, the River Corrib and the Cathedral.

Tuesday, June 20, 2000 - 10:00-17:00

Visit the Burren and the Cliffs of Moher

Cost £35 per person. Includes round-trip transportation, entrance fees, lunch, and private guide.

This tour will depart the University at 10:00 and is accompanied by a professional guide. Our first stop is Dunguaire Castle, Kinvara Village for photos. Dunguaire Castle was built in 1520 and is scenically located overlooking Galway Bay. The tour will continue through the centre of the Burren, a limestone area famous for its natural beauty and wildlife. Arctic and Alpine plants grow here side by side with Mediterranean plants. The tour will pass by the Poul nabrone Dolmen; a 5,000-year-old tomb used by the Stone Age dwellers to bury their dead. The journey will continue to the seaside resort of Lahinch where lunch is arranged in a local restaurant. After lunch we will stop at the spectacular Cliffs of Moher, rising to 215 meters over the Atlantic Ocean. From these high cliffs, the views of the Clare coastline and the Aran Islands are incredible. The tour continues back through Lisdoonvarna, a famous spa town, and then direct to Galway City.

Thursday, June 22, 2000 - 9:00-17:30

Visit the Historic Aran Islands

Cost £45 per person. Includes bus and ferry transportation, lunch, and private guide.

The three Aran Islands located in the mouth of Galway Bay are criss-crossed by dry stone walls. The landscape is beautiful but bleak with soaring cliffs rising out of the Atlantic. Aran has retained much of the old Gaelic culture, Gaelic is still the spoken language of the Islanders and traditional music and song have been well preserved there.

You will be collected by coach and transferred to the ferry port of Rossaveal where you will board a modern ferry to Inis Mór, the largest of the three Aran Islands. Local guides will transfer you by minibus to the Dun Aengus Fort - a spectacular prehistoric fort built on a cliff above the crashing Atlantic Ocean. En route to the Fort, they will fascinate you with interesting stories about the history and folklore of the Island. Lunch is arranged in the main village of Kilronan and you will have some free time to explore the village with its pubs and craft shops before returning to the mainland.

Friday, June 23, 2000 - 10:00-Noon

A Visit to Lorna McMahon's Gardens

Cost £20 per person. Includes round-trip transportation, entrance fee, and mid-morning refreshments.

Depart the University by coach. You will enjoy a tour of these magnificent gardens, which surround Lorna McMahon's home and were created by her single handedly. For 25 years, she

has carved out a delightful and in places magical garden from hazel wood, rough scrub, rocks and bog. The garden extends over 4 acres, and is subdivided into 12 gardens each with its own speciality. The garden is a personal project and several sections are called after friends and relatives. There is a Japanese garden with a large brooding Yukumi or 'snow viewing' lantern and by way of contrast there is a herbal garden laid out in Elizabethan style containing all the herbs mentioned in the Bible or in Shakespearean plays.

SPECIAL EVENTS

Sunday June 18, 2000 at 19:00

Welcome Reception – University Bar

The Welcome Reception will be held on Sunday evening from 19:00 to 21:00 in University Bar, and is open to all attendees and guests. Be sure to pick up your conference badge for admission. This is a wonderful time of fellowship and will provide the opportunity to see old friends or make new acquaintances. Refreshments and samples of local cuisine will be provided with Irish music in the background.

Breakfasts

For attendees and guests staying at Corrib Village only a continental breakfast will be provided each morning at the main restaurant on the Campus. Hotel guests are provided with a breakfast at their hotels. Please note that a separate breakfast is held for presenters at the main restaurant on the Campus.

Wednesday, June 21, 2000 – 13:45-18:00

Afternoon Tours

A number of tours will take place during the conference for both attendees and accompanying guests. Places on each tour will be limited and will be allocated on a first-come, first-served basis. Each registration fee covers the cost of one tour; additional tour tickets for guests may be purchased at the conference subject to availability. Please indicate your tour preference when filling in the **conference registration form**. The following visits will be arranged.

Tour 1A - Cruise to Annaghdown and Guided Tour around Lough Corrib

Delegates assemble outside the James Hardiman Library before being accompanied for a short walk to Woodquay to board the Corrib Princess, a luxury river cruiser, for a guided cruise to Annaghdown. The journey takes passengers along the majestic River Corrib and onto the lake providing visitors with unsurpassed views of the historic monuments and natural amenities that make this the most spectacular waterway in Ireland. Passengers are treated to a comprehensive commentary covering all major points of interest including wildlife, the Cathedral and Menlo Castle. Tea/coffee and homemade scones

are served on board before we dock at Annaghdown.

Annaghdown is an important angling centre, also renowned for its varied collection of ecclesiastical ruins. This scenic tour will continue by coach and follow the shoreline of Lough Corrib through the villages of Cong, Clonbur and Cornamona. As we drive, the landscape changes from mountains and lakes to greenery. The tour will travel to Maam Cross where there is a replica of the cottage used in the film "The Quiet Man". We will continue through Oughterard and Moycullen Village back to Galway City and arrive back to the University at 18:00.

Tour 1B - Guided Tour around Lough Corrib and Cruise from Annaghdown to Galway

Delegates assemble in the car park at St. Columba's Church NUI, Galway before departing by coach for a guided tour around Lough Corrib (as above in reverse). 15:45 arriving to the pier at Annaghdown for a guided cruise back to Galway with refreshments on board. 18:00 arrive Woodquay, Galway.

Tour 2 - Historical Walking Tour of Galway and a Visit to Galway Crystal

Delegates will assemble off campus in the car park at the Cathedral. During the tour we will visit Galway Irish Crystal Heritage Centre. The centre provides an excellent introduction to the West of Ireland's rich history and culture. This Georgian style building houses a sweeping staircase and magnificent chandelier, a great hall, a showroom and an interpretative centre with a Claddagh Village exhibit. We will visit the crystal workshop where you can see master craftsmen cutting, engraving and creating various designs on crystal. Refreshments are arranged in the restaurant before our tour continues to Galway City where you will enjoy a guided walking tour of historical Galway including the Cathedral, Lynch's Castle, St. Nicholas' Church, the Spanish Arch and Eyre Square.

Tour 3 - Guided Tour of Connemara

Delegates will assemble at the Archway of the Quadrangle. Connemara is one of Europe's last great natural wildernesses with town and villages existing along the beautiful, indented coastline. The beauty of Connemara lies in its rocky and rugged landscape, covered in purple heather and desolate tracts of brown bog-land dotted with lakes and its backdrop of purple mountains. The tour will take the group along Lough Corrib, through the villages of Moycullen and Oughterard to Maam Cross where there is a replica of the cottage used in the film "The Quiet Man". We will travel through the beautiful Maam Valley to the village of Leenane which is backed by the Maamturk Mountains and facing Killary Harbour.

The tour will stop at Kylemore Abbey, once the castle of Mitchell Henry, M.P. and now a convent and school of the Benedictine Nuns. Tea/coffee and homemade scones are served in the tearooms and delegates will have an opportunity to explore

the grounds including the Gothic Church and Craft Shop. The tour will continue through the Inagh Valley direct to Galway City.

Wednesday, June 21 at 19:30

Conference Banquet - Corrib Great Southern Hotel

The Banquet takes place at the Corrib Great Southern Hotel. The Oriel String Quartet will entertain at the pre dinner reception and the after dinner entertainment will include young Irish dancers in traditional costumes. Throughout the evening a band will perform a medley of traditional and contemporary Irish music. For the grand finale, a variety of dances similar to Riverdance will be performed by a troupe of Irish dancers.

Buses depart from Corrib Village and the Great Southern Hotel at Eyre Square from 19:00. A bus service will return you to your accommodation starting at 23:00.

Thursday, June 22, 2000 at 20:00

Concert at St Nicholas' Collegiate Church

This event features Cois Cladaigh, a Galway based chamber choir specialising in European music from the late 15th and early 16th centuries and contemporary choral music, particularly from Ireland. The concert takes place at St. Nicholas' Collegiate Church, which dates from the 12th century. Christopher Columbus visited this church before he set out for the New World.

Friday, June 23, 2000 at 12:30

Awards Luncheon - University Restaurant

The annual IEEE Power Electronics Society Awards Luncheon will be held at 12.30 on Friday to honor technical and service contributions to our profession. These awards include the highest honor given in the field of power electronics, the William E. Newell Award, the Richard M. Bass Young Power Electronics Engineer Award, and the Outstanding Service Award. Each registration includes a luncheon ticket. Additional tickets for guests can be purchased for £15 each.

TECHNICAL PROGRAM

TUTORIAL SESSIONS

Sunday June 18, 2000 at 9:00 - Cairnes Theatre

1) Advanced DSP-Based Motor Control Concepts

F. Moynihan and P. Kettle, Digital Control Systems Group, Analog Devices, USA

The aim of this tutorial is to provide an introduction to advanced digital control concepts for motor control, with particular emphasis on emerging applications in the white-goods,

automotive and industrial markets. The tutorial will present an overview of the fundamental control requirements for common three-phase ac motors and will outline the performance requirements for many common variable-speed motor control applications. The tutorial will emphasize the use of Extended Kalman Estimation techniques for speed and position estimation in brushless permanent magnet motors and different techniques for sensorless vector control of ac induction motors. Finally, the tutorial will review innovative and cost-effective current sensing topologies for cost-sensitive applications. Both hardware and software engineers who work on variable-speed motor control for automotive, appliance or industrial applications will find the course informative.

Sunday June 18, 2000 at 9:00 – D’Arcy Thomson

2) A Building-Block Approach to Switch-Mode Power Electronics, that is Pedagogical as well as Practical for Designers of DC Power Supplies, Power-Factor-Correction Circuits and Motor Drives

N. Mohan, University of Minnesota, USA

This tutorial presents in-depth treatment of a design-oriented theory of switch-mode power electronics (from dc-dc converters to three-phase ac-motor drives), hitherto overlooked, using a true building-block approach. The generic building-block is analyzed only once, and then used systematically for any application. A general-purpose simulator (PSPICE, for example) is utilized to bridge theory with design, thus avoiding complicated analysis that serves no useful purpose in practice. It is shown that the averaged model of the building-block, derived by cycle-by-cycle averaging, speeds up large-disturbance simulations by two orders of magnitude, compared to the switching model. Usefulness of this approach is illustrated by four design examples: Flyback converters with voltage-mode and peak-current-mode control, power-factor-correction circuits (PFC) with average-current-mode control, and motor drives with torque, speed and position feedback loops.

Sunday June 18, 2000 at 14:00 - Cairnes Theatre

3) Efficient Low Output Voltage Power Conversion Techniques

R. Severns, Springtime Enterprises, USA

Integrated circuits using voltages well below 5 V are now common and devices requiring voltages as low as 1 V are appearing. Efficiency, at an acceptable cost, has long been a problem with 5 V power supplies. Lowering the voltage, while maintaining the power level, makes the efficiency-cost trade-off even more difficult. This half-day tutorial presents a comprehensive review of the problems, tradeoffs, design

solutions and inherent limits of low voltage power supplies. The material is very practical and can be immediately applied by the student to modify existing designs and to create new designs.

Sunday June 18, 2000 at 14:00 – D’Arcy Thomson

4) Status of the Techniques of Three-Phase PWM Rectifier Systems with Low Effects on the Mains

J.W. Kolar, TU Vienna, AUSTRIA

This practice-oriented tutorial gives an in-depth introduction to all important aspects of the evaluation, analysis and design of three-phase power factor correction (PFC) systems. Starting with a review, classification and brief description of all relevant three-phase converter topologies which have been proposed in the literature during the last decade, the basic principle of operation of selected systems will be discussed in detail using phase quantities and space vector calculus. Advantages and drawbacks of single-stage and two-stage isolated AC/DC power conversion will be clarified. Characteristic quantities facilitating the evaluation of various concepts for a given application will be defined. Furthermore, modulation methods, control-oriented behaviour, different controller concepts and the controller design for buck-type and boost-type systems will be treated. Also, a simple concept for determining the stresses on the power components will be proposed and the procedure for dimensioning a three-phase PWM rectifier system will be discussed. In connection with this, the status of different power semiconductor technologies, cooling concepts and packaging techniques will be treated and guidelines for selecting the optimal switch for a different input voltage and power levels will be given. Further important points will be a comparative evaluation of high power telecommunications power supply modules concerning power density, efficiency and volume and measures for guaranteeing electromagnetic compatibility by differential-mode and common-mode filtering. Finally, the advantages and drawbacks of various simulation tools for application in system design will be discussed and laboratory models of novel PWM rectifier topologies will be shown. Also, alternative concepts for power factor improvement like active filters and other new developments in the field will be treated.

RAP SESSIONS

Tuesday June 20, 2000 at 19:00 - O’Flaherty Theatre

"Packaging is Your Only Man"

Moderator: J.D. van Wyk, Virginia Polytechnic Institute and State University, USA

Recent developments in the power electronics industry increasingly emphasise a dramatic change in the technological drivers that will shape the future of power systems architecture. The traditional drivers of innovation in electronic topologies are being overtaken by issues relating to packaging and assembly or, more generically, system integration. This shift is also being described by the term electro-physical integration.

This trend is requiring a paradigm shift in power electronics research and development in terms of the nature of the system design effort and the personnel resources required to develop future power systems. This shift will require a move towards multidisciplinary teams combining expertise in electronics, materials, mechanical engineering, manufacturing and system design.

Tuesday June 20, 2000 at 19:00 – D’Arcy Thomson
Computer Design Aids: Boon or Bane?

Moderator: D. Hamill, University of Surrey, UK

Immense computational power is now available from every engineer's desk. But is it actually delivering what we want? Are computers helpful in power electronics design, or do they fail to live up to their promise? Does simulation save time that used to be spent tinkering with prototypes, or is it a time waster? Will our problems be solved when even more number crunching power comes along, or are the right tools still to be invented? Can computers give insight into power converter operation, or does the technology get in the way? Is the Internet a useful source of information, or is it just a distraction? Is the price of specialised software realistic, or would the money be better spent on test equipment?

Tuesday June 20, 2000 at 19:00 - Cairnes Theatre
Line-Harmonics Regulation - Why (or Why Not) and How?

Moderator: R. Redl, ELFI, SWITZERLAND

Achieving compliance with the limits of the European harmonic regulation norm EN61000-3-2 is an inexhaustible research topic for college professors, a professional challenge for design engineers, and a pain for the equipment makers and customers who have to pay for it. Is it really necessary to regulate the line harmonics, or perhaps the regulation is only the manifestation of European protectionism and bureaucracy? If regulation is needed, what should be regulated, the equipment or the customer? If the equipment is to be regulated, should it not be sufficient to include only the two most polluting ones, colour TV and computer? How about compact fluorescent lamps? Are the present harmonic limits reasonable? Is it proper to exploit the existing deficiencies of the norm to achieve compliance at reduced cost?

Come join our panel of experts as they debate why or why not harmonics regulation is needed, how it should be done, what are the reasonable limits, and what is the best way to achieve compliance.

SESSION 1. PLENARY

Monday June 19, 2000 at 9:00 - O'Flaherty, D'Arcy Thomson

Chairs: W.G. Hurley, NUI, Galway, IRELAND

J. Madden, PEI Technologies, IRELAND

- 09:00 Official Opening of the Conference**
Dr. P. Fottrell, President, National University of Ireland, Galway, IRELAND
- 09:25 Paper 1.1. Advances in Enabling Technologies**
D. Staffiere, Staffiere Consulting Services, USA
- 09:50 Paper 1.2. Automotive Power Electronics - New Challenges for Power Electronics**
H.-P. Schöner, P. Hille, Daimler Chrysler AG, GERMANY
- 10:15 Paper 1.3. Engineering Science Considerations for Integration and Packaging**
J.A. Ferreira, Delft University of Technology, THE NETHERLANDS
- 10:40 BREAK**

SESSION 2. PWM TECHNIQUES I

Monday June 19, 2000 at 11:10 - O'Flaherty Theatre

Chair: F. Blaabjerg, Aalborg University, DENMARK

- 11:10 Paper 2.1. A Novel Double Hysteresis-Band Current Control for a Three-Level Voltage Source Inverter**
M. Lafoz, I.J. Iglesias, CEDEX, SPAIN, M. Visiers, ENERTRON S.A., SPAIN, C. Veganzones, Polytechnic University of Madrid, SPAIN
- 11:35 Paper 2.2. A Randomized Voltage Vector Switching Scheme for 3-Level Power Inverters**
C.K. Lee, S.Y.R. Hui, H. Chung, City University of Hong Kong, HONG KONG
- 12:00 Paper 2.3. Implementation of Three Level Hysteresis Current Control for a Single Phase Voltage Source Inverter**
G. H. Bode, D. G. Holmes, Monash University, AUSTRALIA

SESSION 3. INTEGRATION AND PACKAGING I

Monday June 19, 2000 at 11:10 - Kirwan Theatre

Chair: C. O'Mathuna, National Microelectronics Research Centre, IRELAND

- 11:10 Paper 3.1. StatPEP-Current Status of Power Electronic Packaging for DC/DC and AC/DC Converters**
P. Cheasty, J. Flannery, M. Meinhardt, M. Ludwig, V. Leonavicius, S.C. O'Mathuna, PEI Technologies-NMRC Cork, IRELAND, A. Alderman, International Rectifier, IRELAND
- 11:35 Paper 3.2. Integrated EMI/Thermal Design for Switching Power Supplies**
W. Zhang, F.C. Lee, D.Y. Chen, Virginia Polytechnic Institute and State University, USA
- 12:00 Paper 3.3. Thermal Optimisation of Mechanically Integrated Electronics for an EC Radiator**
Th. Kaiser, W. Staiger, R. Orthmann, DaimlerChrysler AG, GERMANY, D. George, P. Hübner, TEMIC, GERMANY

SESSION 4. INDUCTION MOTOR DRIVES

Monday June 19, 2000 at 11:10 - Cairnes Theatre

Chair: J.M.D. Murphy, University College Cork, IRELAND

- 11:10 Paper 4.1. Active Damping Control of PWM CSI-Based Induction Motor Drives**
J.D. Ma, B. Wu, Ryerson Polytechnic University, CANADA
- 11:35 Paper 4.2. Reduction of Current Ripple and Acoustic Noise in Dual-Inverter Pole-Changing Induction Motor Drives**
K.T. Chau, S.Z. Jiang, C.C. Chan, University of Hong Kong, HONG KONG
- 12:00 Paper 4.3. Parameter Sensitivity of an Induction Machine Flux Observer**
E. Delmotte, B. Semail, J.-P. Hautier, L2EP, FRANCE

SESSION 5. SEMICONDUCTOR DEVICES I

Monday June 19, 2000 at 11:10 - D'Arcy Thomson Theatre

Chair: J. Hudgins, University of South Carolina, USA

11:10 Paper 5.1. Forward Biased Safe Operating Area of the COOLMOS

B. Zhang, Z. Xu, A.Q. Huang, Virginia Polytechnic Institute and State University, USA

11:35 Paper 5.2. A Novel Approach for Realizing Hard-Driven Gate Turn-Off Thyristor

Y. Li, Virginia Polytechnic Institute and State University, USA

12:00 Paper 5.3. Soft-Switching Type Multiple-Chip Power Device

S. Igarashi, Y. Nishikawa, T. Nozawa, H. Ohta, Fuji Electric Co. Ltd., JAPAN

SESSION 6. CONTROL OF DISTRIBUTED SYSTEMS

Monday June 19, 2000 at 11:10 - Larmor Theatre

Chair: J. Cobos, Universidad Politecnica de Madrid, SPAIN

11:10 Paper 6.1. Three Dimensional Stability Analysis of DC Power Electronics Based Distribution Systems

S.D. Sudhoff, S.F. Glover, Purdue University, USA

11:35 Paper 6.2. AC Load Conditioner and DC Bus Conditioner for a DC Distribution Power System

R. Zhang, GE Corporate Research and Development, USA, F.C. Lee, D. Borrojevic, C. Liu, Virginia Polytechnic Institute and State University, USA

12:00 Paper 6.3. A New Control Architecture for Distributed Power Electronics Systems

I. Celanovic, J. Guo, D. Borrojevic, Virginia Polytechnic Institute and State University, USA

SESSION 7. PWM TECHNIQUES II

Monday June 19, 2000 at 14:00 - O'Flaherty Theatre

Chairs: P.T. Krein, University of Illinois, USA

H. Matsuo, Nagasaki University, JAPAN

14:00 Paper 7.1. Modulation and Control Strategies of ZCT Three-Level Chopper for SMES Application

D. Peng, D.-H. Lee, F.C. Lee, D. Borrojevic, Virginia Polytechnic Institute and State University, USA

14:25 Paper 7.2. Optimal Vector Modulation of a PWM Current Source Converter According to Minimal Switching Losses

T. Halkosaari, H. Tuusa, Tampere University of Technology, FINLAND

14:50 Paper 7.3. Space Vector Alfa-Beta Sliding Mode Current Controllers for Three-Phase Multilevel Inverters

J. Fernando Silva, N. Rodrigues, J. Costa, IST, DEEC, PORTUGAL

15:15 Paper 7.4. A Novel Concept for Reconstruction of the Mains Phase Currents of a Three-Phase/Switch/Level PWM (Vienna) Rectifier Based on Neutral Point Current Measurement

J.W. Kolar, U. Drogenik, F. Stogerer, Technical University Vienna, AUSTRIA

15:40 BREAK**16:10 Paper 7.5. Fuzzy Logic Space Vector Current Control of Three-Phase Inverters**

J. Torrico Altuna, E. Bim, UNICAMP/FEEC, BRAZIL

16:35 Paper 7.6. Repetitive Waveform Correction Technique for CVCF-SPWM Inverters

Z. Kai, K. Yong, X. Jian, Z. Hui, C. Jian, Huazhong University of Science and Technology, P.R. CHINA

17:00 Paper 7.7. A ZVS PWM Inverter with Voltage Clamping Technique Using Only a Single Auxiliary Switch

M. Mezaroba, D. Cruz Martins, I. Barbi, INEP, BRAZIL

SESSION 8. SOFT SWITCHING DC-DC CONVERTERS

Monday June 19, 2000 at 14:00 - Kirwan Theatre

Chairs: N. Sokal, Design Automation, Inc., USA

T. Ninomiya, Kyushu University, JAPAN

14:00 Paper 8.1. Transformer Parasitic Reactive Components-Assisted Soft-Switching PWM Inverter Type DC-DC Converter with ZCS Power Switches

T. Morimoto, K. Saitou, S. Shirakawa, M. Nakaoka, Yamaguchi University, JAPAN

14:25 Paper 8.2. 42/14 V Two-Quadrant DC/DC Soft-Switching Converter

F.L. Luo, L. Jin, Nanyang Technical University, REPUBLIC OF SINGAPORE, J.G. Kassakian, Massachusetts Institute of Technology, USA

14:50 Paper 8.3. An Improved Full-ZVS-Range Hybrid DC-DC Converter with Low Filter Requirement Capable of Adding and Subtracting the Controlled and Uncontrolled Sections

R. Ayyanar, N. Mohan, University of Minnesota, USA

15:15 Paper 8.4. Generalized Analysis of Soft-Switching DC-DC Converters

J. Abu-Qahouq, I. Batarseh, University of Central Florida, USA

15:40 BREAK

16:10 Paper 8.5. A Unified Approach to Developing Soft Switching PWM Converters

T.-F. Wu, S.-A. Liang, C.-H. Lee, National Chung Cheng University, TAIWAN

16:35 Paper 8.6. A Primary Side Clamping Circuit Applied to the ZVS-PWM Asymmetrical Half-Bridge Converter

M. Lobo Heldwein, A. Ferrari de Souza, I. Barbi, Federal University of Santa Catarina, BRAZIL

17:00 Paper 8.7. An Isolated ZVS-PWM Active Clamping Non-Pulsating Input and Output Current DC-DC Converter

E.F. Ribeiro Romanelli, I. Barbi, INEP/UFSC, BRAZIL

SESSION 9. ADJUSTABLE SPEED DRIVES

Monday June 19, 2000 at 14:00 - Cairnes Theatre

Chairs: T.M. Jahns, University of Wisconsin - Madison, USA

G. Young, Commergy Ltd., IRELAND

14:00 Paper 9.1. Power Electronics Monitoring for a Voltage Source Inverter Drive

C. Kral, K. Kafka, Vienna University of Technology, AUSTRIA

14:25 Paper 9.2. An Improved RPWM Technique Based on a Novel Multi-Level Linear Congruential Random-Number Generator

K.A. Almarri, J.C. Balda, University of Arkansas, USA

14:50 Paper 9.3. A Four Level Drive with Isolated DC Power Supplies

G. Sinha, GE Corporate Research and Development, USA, T.A. Lipo, University of Wisconsin-Madison, USA

15:15 Paper 9.4. A Novel Dual-Stator Winding Induction Generator with a 4-Switch Inverter-Battery Scheme for Control

O. Ojo, Tennessee Technical University, USA, I. Davidson, University of Pretoria, SOUTH AFRICA

15:40 BREAK

16:10 Paper 9.5. Short Term Ride through Capabilities for Direct Frequency Converters

C. Klumpner, I. Boldea, University Politehnica of Timisoara, ROMANIA, F. Blaabjerg, Aalborg University, DENMARK

16:35 Paper 9.6. A BLDCM Drive with Trapezoidal Back EMF Using Four-Switch Three Phase Inverter

J.H. Lee, S.C. Ahn, D.S. Hyun, Hanyang University, KOREA

17:00 Paper 9.7. Fault Detection in Voltage-Fed PWM Motor Drive Systems

R.L.A. Ribeiro, C.B. Jacobina, A.M.N. Lima, E.R.C. da Silva, Dee- Univ. Federal da Paraiba, BRAZIL

SESSION 10. MODELLING OF DEVICES AND RELATED ISSUES

Monday June 19, 2000 at 14:00 - D'Arcy Thomson Theatre

Chairs: A. Stankovic, Northeastern University, USA
P.R. Palmer, Cambridge University, UK

- 14:00 Paper 10.1. A Physics-based MTO Model for Circuit Simulation**
Y. Bai, A.Q. Huang, Virginia Polytechnic Institute and State University, USA
- 14:25 Paper 10.2. Application of New Distributed IGBT and Diode Models to the Analysis of Chopper Cells and Short Circuits with Saber**
J.L. Massol, M. Bareille, J.M. Dienot, F. Dubreuil, IUT TARBES/GECET and LAAS/CNRS, FRANCE
- 14:50 Paper 10.3. Leakage-Impedance Model for Multiple-Winding Transformers**
V. A. Niemela, Bell Labs, Lucent Technologies, USA
- 15:15 Paper 10.4. Synthesis of a Wide-Bandwidth Current Sensor Using a Current Transformer for Active Power Filter Applications**
Y.-K. Wong, Y.-S. Lee, D.K.-W. Cheng, The Hong Kong Polytechnic University, HONG KONG
- 15:40 BREAK**
- 16:10 Paper 10.5. PECS - An Efficacious Solution for Simulating Switched Networks with Nonlinear Elements**
D. Li, R. Tymerski, Portland State University, USA, T. Ninomiya, Kyushu University, JAPAN
- 16:35 Paper 10.6. Time Evolution of Haar Spectra for Periodic Switching Circuits**
A. Gandelli, A. Monti, F. Ponci, Politecnico di Milano, ITALY
- 17:00 Paper 10.7. Error Estimation on Power Switching Losses Based on Electrical Measurements**
K. Ammous, O. Brevet, B. Allard, H. El Omari, D. Bergogne, D. Ligot, R. Ehlinger, H. Morel, CEGELY, INSA-Lyon, FRANCE, A. Ammous, F. Sellami, LEI, ENIS-Sfax, TUNISIA

SESSION 11. MAGNETICS TECHNOLOGY

Monday June 19, 2000 at 14:00 - Larmor Theatre

Chairs: C.R. Sullivan, Dartmouth College, USA
M. Duffy, PEI Technologies, IRELAND

- 14:00 Paper 11.1. Multi-Chambered Planar Magnetics Design Techniques**
G. Bloom, e/j BLOOM associates Inc., USA
- 14:25 Paper 11.2. MCM-L Integrated Transformers for Low Power Applications**
M. Duffy, S. O'Reilly, T. O'Donnell, S.C. O'Mathuna, PEI Technologies, NMRC, IRELAND
- 14:50 Paper 11.3. Design of a Flyback Transformer Using a Stress Annealing Nanocrystalline Alloy**
F. Costa, F. Alves, D. Herisson, LESIR, FRANCE
- 15:15 Paper 11.4. Superconducting Self-Resonant Air-Core Transformer**
H.L. Chan, K.W.E. Cheng, D. Sutanto, The Hong Kong Polytechnic University, HONG KONG
- 15:40 BREAK**
- 16:10 Paper 11.5. Design, Modeling, and Analysis of Integrated Magnetics for Power Converters**
D. K.-W. Cheng, L.-P. Wong, Y.-S. Lee, The Hong Kong Polytechnic University, HONG KONG
- 16:35 Paper 11.6. Low-Voltage Semiconductor Topology for kV Pulse Generation Using a Leakage Flux Corrected Step-up Transformer**
L.M. Redondo, E. Margato, Instituto Superior de Engenharia de Lisboa, PORTUGAL, J. Fernando Silva, CAULT/IST, Universidade Técnica de Lisboa, PORTUGAL
- 17:00 Paper 11.7. Power Factor Correction for AC-DC Converters with Cost Effective Inductive Filtering**
W. Wölfle, Convertec Ireland, IRELAND, W.G. Hurley, National University of Ireland, Galway, IRELAND, S. Arnoult, ENSERB, FRANCE

SESSION 12. POWER FACTOR CORRECTION CIRCUITS I

Tuesday June 20, 2000 at 9:00 - O'Flaherty Theatre

Chairs: R. Severns, Springtime Enterprises Inc., USA
D.G. Holmes, Monash University, AUSTRALIA

09:00 Paper 12.1. Optimization of Combined Voltage-Source-Current-Source Charge-Pump Power-Factor-Correction Electronic Ballast

F. Tao, F. C. Lee, Virginia Polytechnic Institute and State University, USA, N. Onishi, Matsushita Electric Works R&D, JAPAN

09:25 Paper 12.2. A Three-Level Isolated Power Factor Correction Circuit with Zero Voltage Switching

P.M. Barbosa, F. Canales, F.C. Lee, Virginia Polytechnic Institute and State University, USA

09:50 Paper 12.3. Single-Stage Three-Phase Power-Factor-Correction Circuit Using Three Isolated Single-Phase SEPIC Converters Operating in CCM

R. Ayyanar, N. Mohan, University of Minnesota, USA, J. Sun, Rockwell Collins, USA

10:15 Paper 12.4. Four-Legged Three-Phase PFC Rectifier with Fault Tolerant Capability

R. Zhang, GE Corporate Research and Development, USA, F.C. Lee, C. Liu, Virginia Polytechnic Institute and State University, USA

10:40 BREAK

11:10 Paper 12.5. The Control of Single Phase High Power Factor PWM Converter Using the Sliding Mode Observer

I.W. Yang, Y.S. Kim, W.M. Kim, Inha University, KOREA

11:35 Paper 12.6. A Power Factor Corrector with Bi-directional Power Transfer Capability

D.K. Jackson, S.B. Leeb, Massachusetts Institute of Technology, USA

12:00 Paper 12.7. A Predictive Switching Modulator for Current Mode Control of High Power Factor Boost Rectifier

S. Chattopadhyay, V. Ramanarayanan, V. Jayashankar, Indian Institute of Science, INDIA

SESSION 13. CONTROL AND MODELLING OF DC-DC CONVERTERS

Tuesday June 20, 2000 at 9:00 - Kirwan Theatre

Chairs: J. Thottuvelil, Lucent Technologies, USA
D.C. Hamill, University of Surrey, UK

09:00 Paper 13.1. Variable Structure Control of Buck-derived PWM DC\DC Converters

S.J. Chiang, J.M. Chang, National Lien-Ho College of Technology and Commerce, TAIWAN

09:25 Paper 13.2. High-Efficiency Ripple-Free Power Converter for Nuclear Magnetic Resonance

F. Silva, A. Galhardo, J. Palma, CAUTL, Instituto Superior de Engenharia de Lisboa, PORTUGAL

09:50 Paper 13.3. Control Loop Design of Parallel Connected Converters Using Sliding Mode and Linear Control Techniques

M. López, L. García de Vicuña, M. Castilla, J. Matas, O. López, Univ. Politécnica de Cataluña, SPAIN

10:15 Paper 13.4. Control-Loop Modeling of the PWM-PD Multiple Output DC/DC Converters

A. Barrado, E. Olias, A. Lazaro, J. Pleite, Universidad Carlos III de Madrid, SPAIN

10:40 BREAK

11:10 Paper 13.5. Design Oriented Analysis of the Digitally Controlled DC-DC Converter

H. Matsuo, F. Kurokawa, H. Etou, Nagasaki University, JAPAN

11:35 Paper 13.6. A New Control Method for Synchronous-Switch Post Regulator

W. Tang, Bell Labs, Lucent Technologies, USA

12:00 Paper 13.7. Evaluation of A Chaotic Switching Scheme for Power Converters

K.K. Tse, S.Y.R. Hui, H. Chung, City University of Hong Kong, W.M. Ng, ASTEC, HONG KONG

SESSION 14. VECTOR CONTROL AND DIRECT TORQUE CONTROL

Tuesday June 20, 2000 at 9:00 - Cairnes Theatre

Chairs: T. Habetler, Georgia Institute of Technology, USA
F. Profumo, Politecnico di Torino, ITALY

- 09:00 Paper 14.1. A Comparison of Vector and Direct Torque Control of an Induction Machine**
D. Telford, M.W. Dunnigan, B.W. Williams, Heriot Watt University, UK
- 09:25 Paper 14.2. Discrete-Time Field-Oriented Control for Induction Motors**
J.-L. Thomas, S. Poullain, ALSTOM Technology, FRANCE
- 09:50 Paper 14.3. A Hybrid Speed Estimator for Induction Motors Considering the Flux Saturation**
J.-S. Choi, Y.-S. Kim, Inha University, KOREA, G.-M. Cho, Yuhan College, KOREA
- 10:15 Paper 14.4. Associating a Multi-Cell Inverter and a Direct Torque Controlled Induction Machine for an Imposed Switching Frequency and a Reduced Ripple**
C.A. Martins, X. Roboam, T.A. Meynard, LEEI, CNRS INPT, FRANCE, A.S. Carvalho, FEUP Porto, PORTUGAL
- 10:40 BREAK**
- 11:10 Paper 14.5. Frequency-Hybrid Vector Control with MIR Strategy for Sensorless Synchronous Motor Drive**
S. Shinnaka, Kanagawa University, JAPAN
- 11:35 Paper 14.6. Torque Ripple Reduction in DTC of Induction Motor Driven by 3-Level Inverter with Low Switching Frequency**
K.-B. Lee, J.-H. Song, I. Choy, J.-Y. Choi, ISCRC, KIST, KOREA, J.-H. Yoon, S.-H. Lee, H.H.I., KOREA
- 12:00 Paper 14.7. Control Strategies for Energy Recovery from a Flywheel Using a Vector Controlled Induction Machine**
R. Cardenas, R. Peña, University of Magallanes, CHILE, G. Asher, J. Clare, University of Nottingham, UK

SESSION 15. POWER QUALITY

Tuesday June 20, 2000 at 9:00 - D'Arcy Thomson Theatre

Chairs: H. Akagi, Okayama University, JAPAN
W.G. Hurley, National University of Ireland, Galway, IRELAND

- 09:00 Paper 15.1. Direct-Coupled Cascade Multilevel Sag Compensator**
A.J. Visser, H. du T. Mouton, J.H.R. Enslin, University of Stellenbosch, SOUTH AFRICA
- 09:25 Paper 15.2. Application of a Boost AC-AC Converter to Compensate for Voltage Sags in Electric Power Distribution Systems**
P.N. Enjeti, O. Montero-Hernández, Texas A&M University, USA
- 09:50 Paper 15.3. A New DSP Controlled Shunt Active Filter for Non Ideal Supply Conditions**
G. Bonifacio, A. Lo Schiavo, P. Marino, A. Testa, II University of Naples, ITALY
- 10:15 Paper 15.4. Frequency Domain Analysis and Evaluation of Differential Mode Input Current for Three-Phase DCM Boost Rectifiers with Different Control Strategies**
J.-C. Crebier, P. Barbosa, F. Canales, F.C. Lee, Virginia Polytechnic Institute and State University, USA, J.-P. Ferrieux, LEG-INPG, FRANCE
- 10:40 BREAK**
- 11:10 Paper 15.5. Design and Implementation of a Fast On-Load Tap Changing Regulator Using Soft-Switching Commutation Techniques**
V. Sanchez, R. Echavarría, CENIDET, MEXICO, J. Vaquero, Universidad Nacional de Educación a Distancia, SPAIN, M. Cotorogea, A. Claudio CENIDET, MEXICO
- 11:35 Paper 15.6. Three-Phase Self-Commutated Static Var Compensator Based on Cúk Converter Topology**
Z. Fedyczak, R. Kasperek, Technical University of Zielona Góra, POLAND
- 12:00 Paper 15.7. Single-Phase Active Power Filters for Distributed Power Factor Correction**
I. Barbi, F. Pöttker de Souza, INEP-UFSC, BRAZIL

SESSION 16. TRANSPORTATION APPLICATIONS

Tuesday June 20, 2000 at 9:00 - Larmor Theatre

Chairs: R. Frank, ON Semiconductor, USA

H.-P. Schöner, Daimler Chrysler, GERMANY

09:00 Paper 16.1. Power-Factor-Corrected Single-Stage Inductive Charger for Electric Vehicle Batteries

D. O'Sullivan, M.J. Willers, M.G. Egan, PEI Technologies, IRELAND, J.G. Hayes, P. Nguyen, General Motors, USA, C.P. Henze, Analog Power Design, Inc., USA

09:25 Paper 16.2. A Magnetic Coupled Simple and High Efficient Battery Management System

H. Sakamoto, K. Harada, K. Nishijima, Kumamoto Institute of Technology, JAPAN

09:50 Paper 16.3. Automatic Gearbox Continuously Controlled by Electromagnetic and Electronic Power Converter

W. Hofmann, M. Paul, P. Tenberge, Chemnitz University of Technology, GERMANY

10:15 Paper 16.4. A Low Cost Three-Phase Zero-Current-Transition Inverter with Three Auxiliary Switches

Y. Li, F.C. Lee, J. Lai, D. Borojevic, Virginia Polytechnic Institute and State University, USA

10:40 BREAK**11:10 Paper 16.5. DC Bus Voltage Control for Double Star Asynchronous Fed Drive under Fault Conditions**

S. Mantero, AD-Tranz, ITALY, A. Monti, C. Spreafico, Politecnico di Milano, ITALY

11:35 Paper 16.6. Computer Aided Design of High Voltage Source for Ionic Motors

P. Maranesi, M. Riva, Università degli studi di Milano, ITALY, G.F. Volpi, Laben S.p.A., ITALY

12:00 Paper 16.7. Design and Analysis of Automotive HID Lamp Ballast System Using Auxiliary winding

K.-C. Lee, B.H. Cho, Seoul National University, KOREA

SESSION 17. POWER FACTOR CORRECTION CIRCUITS II

Tuesday June 20, 2000 at 14:00 - O'Flaherty Theatre

Chairs: E. Landsman, American Power Conversion Corp., USA

J. Clare, The University of Nottingham, UK

14:00 Paper 17.1. Study and Analysis on a High-Frequency Current-Source Single-Stage PFC Converter

J. Zhang, F.C. Lee, Virginia Polytechnic Institute and State University, USA, M.M. Jovanovic, Delta Product Corporation, USA

14:25 Paper 17.2. A New Resonant Single-Stage PFC Converter Suitable for High-Current Low-Voltage Applications

D. O'Sullivan, M.G. Egan, M. Willers, PEI Technologies, IRELAND

14:50 Paper 17.3. New Topologies of Active Input Current Shapers to Allow AC-to-DC Converters to Comply with the IEC 1000-3-2

J. Sebastian, A. Fernandez, P. Villegas, M.M. Hernando, M.J. Prieto, Universidad de Oviedo, SPAIN

15:15 Paper 17.4. Harmonic Suppression and DC Voltage Control of Single-Phase PFC Converter

T. Takeshita, Y. Toyoda, N. Matsui, Nagoya Institute of Technology, JAPAN

15:40 BREAK**16:10 Paper 17.5. Control of Active Power Factor Corrector Using Single Current Sensor**

H. Chung, S.Y.R. Hui, D. Y. Qiu, City University of Hong Kong, HONG KONG

16:35 Paper 17.6. Harmonic Reducer Converter

O. Garcia, M.D. Martinez-Avial, J.A. Cobos, J. Uceda, U.P. Madrid, SPAIN, J. Gonzalez, J.A. Navas, Alcatel, SPAIN

17:00 Paper 17.7. Phase Current and Voltage Sensorless Control of PWM Rectifiers

D.-C. Lee, D.-S. Lim, Yeungnam University, KOREA

SESSION 18. SOFT SWITCHING AND RESONANT DC-DC CONVERTERS

Tuesday June 20, 2000 at 14:00 - Kirwan Theatre

Chairs: M. Cotorogea, CENIDET, MEXICO

T. Sakai, Nippon Telegraph and Telephone Corp., JAPAN

- 14:00 Paper 18.1. A New Inverter Topology of High-Efficient Soft-Switching PWM DC-DC Converter**
S. Hamada, Sansha Electric Mfg. Co. Ltd., JAPAN, T. Morimoto, T. Matsushige, M. Nakaoka, Yamaguchi University, JAPAN
- 14:25 Paper 18.2. A New Family of Zero-Current-Switching Variable-Frequency dc-dc Converters**
G. Spiazzi, P. Mattavelli, University of Padova, ITALY
- 14:50 Paper 18.3. Designing a Half Bridge ZVZCPS with a Parallel Regulation Transformer**
J.A. Carrasco, E. Sanchis, E. Maset, Universidad de Valencia, SPAIN
- 15:15 Paper 18.4. Improved ZVT PWM Boost Converter**
T. Kim, H. Kim, H. Ahn, Kum-oh National University of Technology, KOREA
- 15:40 BREAK**
- 16:10 Paper 18.5. A Evolution of Regenerative Snubber Circuits**
L. dos Reis Barbosa, V. J. Farias, L.C. de Freitas, J. Batista Vieira Jr., Universidade Federal de Uberlandia, BRAZIL
- 16:35 Paper 18.6. Two Sided Latched Pulse Width Modulation Control**
P. Midya, Motorola, USA
- 17:00 Paper 18.7. Soft-Switching Techniques for PWM Full-Bridge Converters**
X. Ruan, Y. Yan, Nanjing University of Aeronautics and Astronautics, P.R. CHINA

SESSION 19. MULTILEVEL CONVERTERS AND HIGH POWER APPLICATIONS

Tuesday June 20, 2000 at 14:00 - Cairnes Theatre

Chairs: J.S. Lai, Virginia Polytechnic Institute and State University, USA

A. Capel, Alcatel-Espace, FRANCE

- 14:00 Paper 19.1. High-power, High-performance Switching Amplifier for Driving Magnetic Resonance Imaging Gradient Coils**
R.L. Steigerwald, GE Corporate R&D, USA, W.F. Wirth, GE Medical Systems, USA
- 14:25 Paper 19.2. Failures-Tolerance and Remedial Strategies of a Flying Capacitors Multilevel Inverter**
P. Baudesson, F. Richardeau, T. Meynard, LEEI-ENSEEIH, FRANCE
- 14:50 Paper 19.3. Interleaved Converters Based on Hysteresis Current Control**
J.S. Batchvarov, J.L. Duarte, M.A.M. Hendrix, Technical University Eindhoven, THE NETHERLANDS
- 15:15 Paper 19.4. An Optimal Controller for Voltage Balance and Power Losses Reduction in MPC AC/DC/AC Converters**
M. Marchesoni, University of Cagliari, ITALY, M. Mazzucchelli, P. Tenca, University of Genova, ITALY
- 15:40 BREAK**
- 16:10 Paper 19.5. Design of an Islanding Detection Circuit for Dispersed Generators with Self-Commutated Static Power Converters**
S.-J. Huang, F.-S. Pai, National Cheng Kung University, TAIWAN
- 16:35 Paper 19.6. A Comparison of Multicarrier PWM Strategies for Cascaded and Neutral Point Clamped Multilevel Inverters**
B.P. McGrath, D.G. Holmes, Monash University, AUSTRALIA
- 17:00 Paper 19.7. Modeling and Control of Zero-Sequence Current in Parallel Multi-Phase Converters**
Z. Ye, D. Borojevic, F.C. Lee, Virginia Polytechnic Institute and State University, USA

SESSION 20. MODELLING OF DC TO DC CONVERTERS

Tuesday June 20, 2000 at 14:00 - D'Arcy Thomson Theatre

Chairs: J. Arau, CENIDET, MEXICO

M.J. Prieto, Universidad de Oviedo, SPAIN

- 14:00** **Paper 20.1. Computer-Aided Optimization of DC/DC Converters for Automotive Applications**
T.C. Neugebauer, D.J. Perreault, J.G. Kassakian, Massachusetts Institute of Technology, USA
- 14:25** **Paper 20.2. Systematic Approach for Developing Large-Signal Averaged Models of Multi-Output PWM Converters**
J.A. Oliver, J.A. Cobos, J. Uceda, Universidad Politecnica de Madrid, SPAIN, M. Rascón, C. Quiñones, Alcatel Corporate Research Center, SPAIN
- 14:50** **Paper 20.3. Dynamic Response Optimization of Quantum Series-Parallel Resonant Converters Using Sliding Mode Control**
M. Castilla, L. García de Vicuña, M. López, O. López, J. Matas, Univ. Politécnica de Cataluña, SPAIN
- 15:15** **Paper 20.4. Instability and Bifurcation in Parallel-Connected Buck Converters under a Master-Slave Current Sharing Scheme**
H.H.C. Iu, C.K. Tse, Hong Kong Polytechnic University, HONG KONG
- 15:40** **BREAK**
- 16:10** **Paper 20.5. Analysis and Optimization of Synchronous Buck Converter at High Slew-Rate Load Current Transients**
R. Miftakhutdinov, Texas Instruments Inc., USA
- 16:35** **Paper 20.6. Analysis and Design of a New Three-Phase LCC-Type Resonant DC-DC Converter with Capacitive Output Filter**
S. Akre, PEI Technologies, IRELAND, M. Egan, University College Cork, IRELAND
- 17:00** **Paper 20.7. A Theoretical and Experimental Investigation of the Nonlinear Dynamics of DC-DC Converters**
S. Mazumder, Virginia Polytechnic Institute and State University, USA, M. Alfayyoum, Virginia Power, USA, A.H. Nayfeh, D. Borojevic, Virginia Polytechnic Institute and State University, USA

SESSION 21. POWER QUALITY AND MOTION CONTROL

Tuesday June 20, 2000 at 14:00 - Larmor Theatre

Chairs: S. Hiti, General Motors - Advanced Technology Vehicles, USA

S. Bolognani, University of Padova, ITALY

- 14:00** **Paper 21.1. Direct Active and Reactive Power Control (DPQ) for a Three-Phase Synchronous Rectifier**
J.M. Carrasco, E. Galván, Seville University, SPAIN, G. Escobar, A. Stankovic, Northeastern University, USA, R. Ortega, CNRS- Supelec, SPAIN
- 14:25** **Paper 21.2. A Novel Control Approach of Three-Level VSIs Using a LQR-Based Gain-Scheduling Technique**
S. Alepuz, Mataro School of Engineering, SPAIN, J. Bordonau, J. Peracaula, Universitat Politecnica de Catalunya, SPAIN
- 14:50** **Paper 21.3. Adaptive Integrator Backstepping for Motion Control: Design, Analysis, and Experiment**
H. Tan, J. Chang, Rockwell Science Center, USA, Y. Tan, University of California, Los Angeles, USA
- 15:15** **Paper 21.4. Dual-Frequency Braking in AC Drives**
M. Rastogi, P. Hammond, Robicon Corporation, USA
- 15:40** **BREAK**
- 16:10** **Paper 21.5. Predictive Control of Inverter Supplied Electrical Drives**
R. Kennel, A. Linder, University of Wuppertal, GERMANY
- 16:35** **Paper 21.6. Digital Current Control of Unbalanced Three-Phase Power Electronic Systems**
C.B. Jacobina, R.O. de Carvalho Jr., Dee- Univ. Federal da Paraiba, BRAZIL, M.B.R. Correa, Dee-Cefet de Alagoas, BRAZIL, A.M.N. Lima, E.R.C. da Silva, Dee- Univ. Federal da Paraiba, BRAZIL
- 17:00** **Paper 21.7. Switched Capacitor Fuzzy Control for Power Factor Correction in Inductive Circuits**
C. Suci, Nottingham Trent University, UK, L. Dafinca, Transilvania University of Brasov, ROMANIA, M. Kansara, Nottingham Trent University, UK, I. Margineanu, Transilvania University of Brasov, ROMANIA

SESSION 22. LOW POWER APPLICATIONS

Wednesday June 21, 2000 at 9:00 - O'Flaherty Theatre

Chairs: W.M. Portnoy, Texas Tech University, USA

P. Bardos, Artesyn Technologies, IRELAND

09:00 Paper 22.1. A High-Quality Rectifier Based on the Forward Topology with Secondary-Side Resonant Reset

G. Spiazzi, University of Padova, ITALY

09:25 Paper 22.2. Wide Input Voltage Converter Using a Quadratic Topology and Windings Integrated in the PCB

M. Gomez, J. Navas, F. San Miguel, Alcatel Corporate Research Center, SPAIN

09:50 Paper 22.3. Low Power Flyback Converter with Synchronous Rectification for a System with AC Power Distribution

A. Fernandez, J. Sebastian, P. Villegas, M.M. Hernando, Universidad de Oviedo, SPAIN, L. Alvarez, Alcatel, SPAIN

10:15 Paper 22.4. A Soft-Switched Full-Bridge Single-Stage AC-to-DC Converter with Low Line-Current Harmonic Distortion

A.K.S. Bhat, R. Venkatraman, Univ. of Victoria, CANADA

10:40 BREAK

11:10 Paper 22.5. A Low-Loss High-Power-Factor Flyback Rectifier Suitable for Smart Power Integration

G. Spiazzi, S. Buso, University of Padova, ITALY, D. Tagliavia, ST Microelectronics, ITALY

11:35 Paper 22.6. An Efficient Single Switch Voltage Regulator

N. Vázquez, C. Hernández, J. Antonio, M. Guzmán, I.T.C., MEXICO, J. Arau, CENIDET, MEXICO

12:00 Paper 22.7. 1 MHz Sinusoidal Gate Driver for Class DE Inverter Operating with Variable Load and Frequency

B. Grzesik, Z. Kaczmarczyk, M. Kasprzak, Silesian Technical University, POLAND

SESSION 23. PWM DC-DC CONVERTERS

Wednesday June 21, 2000 at 9:00 - Kirwan Theatre

Chairs: K.M. Smedley, University of California, USA

J. Breslin, National University of Ireland, Galway, IRELAND

09:00 Paper 23.1. Reduced Redundant Power Processing (R2P2) PFC Voltage Regulators: Circuit Synthesis and Control

C.K. Tse, M.H.L. Chow, Hong Kong Polytechnic University, HONG KONG

09:25 Paper 23.2. A Novel Delta-Sigma Modulated DC-DC Power Converter Utilizing Dither Signal

A. Hirota, Akashi National College of Technology, JAPAN, S. Nagai, Tsuyama National College of Technology, JAPAN, M. Nakaoka, Yamaguchi University, JAPAN

09:50 Paper 23.3. Double DC-DC Converters with Low Input Current Ripple

S. Birca-Galateanu, I.U.F.M. Nantes, FRANCE

10:15 Paper 23.4. Small-Signal Analysis of A New Asymmetrical Half-Bridge DC-DC Converter

S. Abedinpour, University of Illinois at Chicago, USA, R. Liu, Lucent Technologies, USA, K. Shenai, University of Illinois at Chicago, USA

10:40 BREAK

11:10 Paper 23.5. Asymmetrical PWM Flyback Converter

D.H. Seo, O.J. Lee, S.H. Lim, Samsung Electro-Mechanics, KOREA

11:35 Paper 23.6. Analysis and Design of a Non-Dissipative Active Clamp for Forward Converters

G.A. Karvelis, M. Manolarou, S.N. Manias, National Technical University of Athens, GREECE

12:00 Paper 23.7. Generation of a Family of Non-Isolated DC-DC PWM Converters Using New Three-State Switching Cells

G.V. Torrico Bascopé, I. Barbi, INEP, BRAZIL

SESSION 24. SENSORLESS DRIVES

Wednesday June 21, 2000 at 9:00 - Cairnes Theatre

Chairs: A. Murray, Analog Devices, USA

A. Consoli, University of Catania, ITALY

- 09:00** **Paper 24.1. An Analysis of Speed Sensorless Torque and Flux Controller for Induction Motor**
M. Rodic, K. Jezernik, University of Maribor, SLOVENIA
- 09:25** **Paper 24.2. Performance Evaluations of a Position-Sensorless IPM Motor Drive System Based on Detection of Current Switching Ripples**
Y. Kazunori, S. Ogasawara, H. Akagi, Okayama University, JAPAN
- 09:50** **Paper 24.3. Zero Frequency Rotor Position Detection for Synchronous PM Motors**
A. Consoli, G. Scarcella, G. Tutino, DEES - University of Catania, ITALY, A. Testa, DFMTFA - University of Messina, ITALY
- 10:15** **Paper 24.4. A Globally Converging Observer of Mechanical Variables for Sensorless PMSM**
B. Nahid, F. Meybody-Tabar, F.M. Sargos, GREEN, FRANCE
- 10:40** **BREAK**
- 11:10** **Paper 24.5. An Efficient Kalman Filter for Flux Estimation of Induction Motors**
M. Hilairet, F. Auger, C. Darengosse, GE44, FRANCE
- 11:35** **Paper 24.6. A Speed Estimator for Sensorless Vector Control of Induction Machines in the Field Weakening Region**
E. Levi, M. Wang, Liverpool John Moores University, UK
- 12:00** **Paper 24.7. Evaluation of the Influence of Design and Operation of Induction Motor Drives on Sensorless Control Schemes Utilizing Saturation Induced Changes in the Transient Electrical Behaviour**
T.M. Wolbank, B. Haidvogel, Vienna University of Technology, AUSTRIA

SESSION 25. EMI-EMC

Wednesday June 21, 2000 at 9:00 - D'Arcy Thomson Theatre

Chairs: D. Borojevic, Virginia Polytechnic Institute and State University, USA

R. Redl, ELFI S.A., SWITZERLAND

- 09:00** **Paper 25.1. Common Mode Noise Generated by Magnetic Components - Experimental Test Set-up and Measurement Results**
G. Sauerlaender, T. Duerbaum, Philips GmbH Forschungslaboratorien, GERMANY, M. Albach, Friedrich Alexander University, Erlangen, GERMANY, M. Ossmann, Aachen University of Applied Science, GERMANY, T. Tolle, Philips GmbH Forschungslaboratorien, GERMANY
- 09:25** **Paper 25.2. Low Stray Inductance Bus Bar Design and Construction for Good EMC Performance in Power Electronic Circuits**
M. Chiadò Caponet, F. Profumo, Politecnico di Torino, ITALY, R.W. De Doncker, Institut für Stromrichtertechnik und Elektrische Antriebe RWTH-Aachen, GERMANY, A. Tenconi, Politecnico di Torino, ITALY
- 09:50** **Paper 25.3. Common Mode Disturbance Reduction of PFC Full Bridge Rectifiers**
J.-C. Crebier, Virginia Polytechnic Institute and State University, USA, L. Jourdan, R. Popescu, J.-P. Ferrieux, LEG-INPG, USA
- 10:15** **Paper 25.4. Analysis and Reduction of EMI Conducted by a PWM Inverter-Fed AC Motor Drive System Having Long Power Cables**
S. Ogasawara, H. Akagi, Okayama University, JAPAN
- 10:40** **BREAK**
- 11:10** **Paper 25.5. Validation of Numerical Calculations of the Conducted and Radiated Emissions: Application to a Variable Speed Drive**
F. Costa, LESIR ENS Cachan, FRANCE, L. Paletta, Schneider Electric, FRANCE
- 11:35** **Paper 25.6. Techniques for Input Ripple Current Cancellation: Classification and Implementation**
N.K. Poon, M.H. Pong, C.P. Liu, Hong Kong University, HONG KONG, C.K. Tse, Hong Kong Polytechnic University, HONG KONG
- 12:00** **Paper 25.7. Wide-Band Analysis of the Random Modulated Boost Rectifier**
F. Mihalic, M. Milanovic, University of Maribor, SLOVENIA

SESSION 26. UTILITY APPLICATIONS

Wednesday June 21, 2000 at 9:00 - Larmor Theatre

Chairs: M.E. Elbuluk, University of Akron, USA
A. Kelly, North Carolina State University, USA

- 09:00 Paper 26.1. The Chain Cell UPFC**
D.W. Sandels, T.C. Green, Imperial College, UK
- 09:25 Paper 26.2. C-UPFC: A New Facts Controller with 4 Degrees of Freedom**
B.T. Ooi, B. Lu, McGill University, CANADA
- 09:50 Paper 26.3. Averaged Model of the Bootstrap Variable Inductance (BVI)**
M. Tavakoli Bina, D.C. Hamill, University of Surrey, UK
- 10:15 Paper 26.4. The Power Buffer Concept for Utility Load Decoupling**
D. Logue, P. Krein, University of Illinois, USA
- 10:40 BREAK**
- 11:10 Paper 26.5. An LVDC Industrial Power Distribution System Without Central Control Unit**
W. Tang, GE Lighting, USA, R.H. Lasseter, University of Wisconsin-Madison, USA
- 11:35 Paper 26.6. Reactive Power Compensator Using Thyristor PWM Current Source Inverter**
B.M. Han, Myongji University, KOREA
- 12:00 Paper 26.7. A Simple Control Scheme for Hybrid Active Power Filter**
D. Rivas, L. Morán, Universidad de Concepción, CHILE, J. Dixon, Universidad Católica de Chile, CHILE, J. Espinoza, Universidad de Concepción, CHILE

SESSION 27. CONVERTERS I

Thursday June 22, 2000 at 9:00 - O'Flaherty Theatre

Chairs: T. Wilson Sr., Wilmore Electronics Co., Inc., USA
R. Hui, City University of Hong Kong, CHINA

- 09:00 Paper 27.1. Design Trade-Offs of Bi-Flyback and Bi-Forward AC/DC Converters to Comply Low Frequency Harmonic Regulation**
O. Garcia, J.A. Cobos, C. Fernandez, R. Prieto, J. Uceda, U.P. Madrid, SPAIN
- 09:25 Paper 27.2. Interleaved 3-Phase PWM AC/DC Converters Based on a 4 Switch Topology**
B.N. Singh, G. Joos, P. Jain, Concordia University, CANADA
- 09:50 Paper 27.3. A Rugged Converter for Use in Low Battery Voltage Uninterruptible Power Systems**
R. Morrison, PEI Technologies, IRELAND, M. Egan, University College Cork, IRELAND
- 10:15 Paper 27.4. Connection of Inverters to a Weak Grid**
G. Ledwich, Queensland University of Technology, AUSTRALIA, H. Sharma, Curtin University of Technology, AUSTRALIA
- 10:40 BREAK**
- 11:10 Paper 27.5. A Comparative Analysis of Control Algorithms for Three-Phase Line-Interactive UPS System with Series-Parallel Active Power-Line Conditioning Using SRF Method**
S.A. Oliveira da Silva, Centro Federal de Educação Tecnológica do Paraná, BRAZIL, P.F. Donoso-Garcia, P. Cabaleiro Cortizo, Universidade Federal de Minas Gerais, BRAZIL
- 11:35 Paper 27.6. Low-Harmonic Three-Phase Rectifier**
P. Pejovic, University of Belgrade, YUGOSLAVIA
- 12:00 Paper 27.7. Comparative Study of Pulsed DC-Link Voltage Converters**
E.R. da Silva, M.C. Cavalcanti, C.B. Jacobina, Dee-Univ. Federal da Paraiba, BRAZIL

SESSION 28. PWM AND HIGH POWER DC-DC CONVERTERS

Thursday June 22, 2000 at 9:00 - Kirwan Theatre

Chairs: V.A. Niemela, Bell Laboratories, USA

S. Ben-Yaakov, Ben-Gurion University of the Negev, ISRAEL

09:00 Paper 28.1. Bi-directional Pulse-Current Sensors for Bi-directional PWM DC-DC Converters

L.-P. Wong, Y.-S. Lee, D.K.-W. Cheng, The Hong Kong Polytechnic University, HONG KONG

09:25 Paper 28.2. Four-Quadrant Operating Luo-Converters

F.L. Luo, H. Ye, Nanyang Technical University, REPUBLIC OF SINGAPORE, M.H. Rashid, University of West Florida, USA

09:50 Paper 28.3. QSW Rectification for DPS Front-end DC/DC Converters

P.-L. Wong, P. Xu, B. Yang, F.C. Lee, Virginia Polytechnic Institute and State University, USA

10:15 Paper 28.4. Design, Implementation, and Experimental Results of Bi-directional Full-bridge DC/DC Converter with Unified Soft-switching Scheme and Soft-starting Capability

K. Wang, L. Zhu, D. Qu, W.G. Odendaal, J. Lai, F.C. Lee, Virginia Polytechnic Institute and State University, USA

10:40 BREAK

11:10 Paper 28.5. A Full Bridge ZCS PWM Converter for High-Voltage High-Power DC Application

S. Luo, C. Iannello, G. Zhu, I. Batarseh, University of Central Florida, USA

11:35 Paper 28.6. Practicality Of Soft Switched, High Frequency Isolated DC/DC Converter

Y. Khersonsky, M. Zahzah, G. Robinson, P. Huynh, L3 Communications, Power Systems Group, USA

12:00 Paper 28.7. Three Elements Resonant Converter: The LCC Topology by Using MATLAB

G.D. Demetriades, P. Ranstad, ABB Environmental Systems, SWEDEN, C. Sadarangani, Royal Institute of Technology, SWEDEN

SESSION 29. ADVANCE DRIVE AND CONTROL TECHNIQUES

Thursday June 22, 2000 at 9:00 - Cairnes Theatre

Chairs: F. Moynihan, Analog Devices, USA

A. Gandelli, Politecnico di Milano, ITALY

09:00 Paper 29.1. Theoretical and Experimental Comparison of Speed Controllers for Elastic Two-Mass Systems

S. Bolognani, A. Venturato, M. Bigliotto, University of Padova, ITALY

09:25 Paper 29.2. Adaptive Sliding-Mode Control for Motor-Toggle Servomechanism

R.-J. Wai, Y. Ze University, TAIWAN, C.-H. Lin, F.-J. Lin, Chung Yuan Christian University, TAIWAN

09:50 Paper 29.3. Nonlinear Adaptive MIMO Controller for High Performance DC Motor Field Weakening

Z.Z. Liu, F.L. Luo, Nanyang Tech. University, REPUBLIC OF SINGAPORE, M.H. Rashid, University of West Florida, USA

10:15 Paper 29.4. A Sliding Mode Control Technique for Direct Speed Control of Induction Motor Drives

A. Damiano, G. Gatto, I. Marongiu, Università degli Studi di Cagliari, ITALY

10:40 BREAK

11:10 Paper 29.5. Design and Experimentation of a Linear Parameter-Varying Flux Observer

C. Darengosse, LARGE, FRANCE, P. Chevrel, EMN, FRANCE

11:35 Paper 29.6. Speed Control of DC Motor Using Adaptive Variable Structure Control

A.A. El-Samahy, Helwan University, SAUDI ARABIA

12:00 Paper 29.7. Torque Compensation in Permanent Magnet Synchronous Motor Drives for Constant Torque, Varying Flux Operation

S. Vaez-Zadeh, University of Tehran, IRAN

SESSION 30. HARMONICS AND ACTIVE FILTERS

Thursday June 22, 2000 at 9:00 - D'Arcy Thomson Theatre

Chairs: N. Mohan, University of Minnesota, USA

J.H.R. Enslin, KEMA, THE NETHERLANDS

- 09:00 Paper 30.1. Merits and Limitations of Full-Bridge Rectifier with LC Filter in Meeting IEC 61000-3-4 Harmonic-Limit Specifications**
M. Sanz, A. Llombart, F. Gomez, University of Zaragoza, SPAIN
- 09:25 Paper 30.2. Selective Compensation of Cycloconverter Harmonics and Interharmonics by Using a Hybrid Power Filter System**
D. Basic, V.S. Ramsden, P. Muttik, University of Technology Sydney, AUSTRALIA
- 09:50 Paper 30.3. Passivity-Based Controller for Harmonic Compensation in Distribution Lines with Nonlinear Loads**
A. Stankovic, G. Escobar, NorthEastern University, USA, P. Mattavelli, University of Padova, ITALY
- 10:15 Paper 30.4. A Study of Current Harmonics of Electrical Traction Power Supply System**
Z. Ye, Ryerson Polytechnic University, CANADA, K.H. Yuen, E. Lo, M.H. Pong, Hong Kong University, HONG KONG, P. Tang, Huaneng Electric Power Co. Ltd., CHINA
- 10:40 BREAK**
- 11:10 Paper 30.5. A Novel Four-Branched-Inverter-Based-Active-Filter for Harmonic Suppression and Reactive Compensation of an Unbalanced 3-Phase 4 Wires Electrical Distribution System, Feeding AC/DC Loads**
A. Nava-Segura, G. Mino-Aguilar, Universidad de las Americas-Puebla, MEXICO
- 11:35 Paper 30.6. Shunt Active Power Filter Synthesizing Resistive Loads**
J.A. Pomilio, T.E.N. Zuniga, UNICAMP, BRAZIL
- 12:00 Paper 30.7. Active Filter with Optimal DC Side Condenser**
D. Xu, H. Fang, Zhejiang University, P.R. CHINA, Y. S. Lee, Hong Kong Polytechnical University, HONG KONG, E. Masada, The Science University of Tokyo, JAPAN

SESSION 31. DISTRIBUTED RESOURCES

Thursday June 22, 2000 at 9:00 - Larmor Theatre

Chairs: T.A. Lipo, University of Wisconsin-Madison, USA

D. Patterson, Northern Territory University, AUSTRALIA

- 09:00 Paper 31.1. A Transformerless Five Level Cascaded Inverter Based Single Phase Photovoltaic System**
M. Calais, V.G. Agelidis, Curtin University of Technology, AUSTRALIA, M.S. Dymond, L.J. Borle, PowerSearch Ltd., AUSTRALIA
- 09:25 Paper 31.2. A Study on Utility Interactive PV System in Harmony with Utility**
H.-S. Kim, N. Okada, K. Takigawa, CRIEPI, JAPAN
- 09:50 Paper 31.3. A Multi-Function Photovoltaic Power Supply System with Grid-Connection and Power Factor Correction Features**
T.-F. Wu, C.-H. Chang, C.-H. Yang, National Chung Cheng University, TAIWAN, Y.-K. Chen, Chien Kuo Institute of Technology, TAIWAN
- 10:15 Paper 31.4. Fuel Cell Inverters for Utility Applications**
G.A. O'Sullivan, Abacus Controls Inc., USA
- 10:40 BREAK**
- 11:10 Paper 31.5. Transient Performance of Power Circuit Including Virtual Inductance Realized by Fully Digital Controlled Variable Active-Passive Reactance (VAPAR)**
H. Funato, T. Ohtaki, A. Kawamura, K. Kamiyama, Utsunomiya University, JAPAN
- 11:35 Paper 31.6. Performance Evaluation of Low Power DC/DC Converter Modules at Cryogenic Temperatures**
M.E. Elbuluk, University of Akron, USA, S. Gerber, A. Hammoud, Dynacs Engineering, Inc., USA, R.L. Patterson, NASA Glenn Research Center, USA
- 12:00 Paper 31.7. Interconnection of a Photovoltaic Panels Array to a Single-Phase Utility Line from a Static Conversion System**
D. Cruz Martins, R. Demonti, INEP, BRAZIL

SESSION 32. SOFT SWITCHING TECHNIQUES

Thursday June 22, 2000 at 14:00 - O'Flaherty Theatre

Chairs: F.C. Lee, Virginia Polytechnic Institute and State University, USA

J. O'Callaghan, Artesyn Technologies, IRELAND

14:00 Paper 32.1. Phase-Lock Circuit for ZVT Inverters with Two Auxiliary Switches

J.-Y. Choi, D. Borojevic, F.C. Lee, Virginia Polytechnic Institute and State University, USA

14:25 Paper 32.2. A Simplified Control Scheme for Zero Voltage Transition (ZVT) Inverter Using Coupled Inductors

W. Dong, D. Peng, H. Yu, F.C. Lee, J. Lai, Virginia Polytechnic Institute and State University, USA

14:50 Paper 32.3. Three-Phase Current-Fed Converter with Resonant Snubber and Commutation Inductors

M. Ishibashi, Yamaguchi University, JAPAN, Y. Konishi, Fuji Electric Co. Ltd., JAPAN, M. Nakaoka, Yamaguchi University, JAPAN

15:15 Paper 32.4. Lossless Capacitive Snubber-Assisted Auxiliary Resonant DC Link Voltage-Fed Soft Switching

M. Kurokawa, C.Y. Inaba, Yamaguchi University, JAPAN, Y. Konishi, Fuji Electric Co. Ltd., JAPAN, Mustuo Nakaoka, Yamaguchi University, JAPAN

15:40 BREAK**16:10 Paper 32.5. Analysis of the Novel Soft-Switching Buck-Boost Type AC-DC Converter Using Magnetic Coupling**

H. Matsuo, Nagasaki University, JAPAN, H. Watanabe, Shindengen Electric Mfg. Co., Ltd., JAPAN, F. Kurokawa, Nagasaki University, JAPAN, L. Tu, Shindengen Electric Mfg. Co., Ltd., JAPAN

16:35 Paper 32.6. Series Resonant High-Voltage ZCS-PFM DC-DC Converter with Voltage Multiplier for Medical Power Electronics

J. Sun, H. Konisi, Y. Ogono, Kyoto Denki Co. Ltd., JAPAN, M. Nakaoka, Yamaguchi University, JAPAN

17:00 Paper 32.7. A Three-Phase Single-Stage AC/DC Boost Integrated Series Resonant Converter

F.S. Hamdad, A.K.S. Bhat, University of Victoria, CANADA

SESSION 33. INTEGRATION AND PACKAGING II

Thursday June 22, 2000 at 14:00 - Kirwan Theatre

Chairs: J.D. Van Wyk Virginia Polytechnic Institute and State University, USA

J.A. Ferreira, Delft University of Technology, THE NETHERLANDS

14:00 Paper 33.1. Three-dimensional Packaging of Integrated Power Electronics Modules

G.-Q. Lu, X. Liu, Virginia Polytechnic Institute and State University, USA

14:25 Paper 33.2. The Effect of Printed Circuit Board on Cooling and EMC of Switched Mode Power Supply

M. Sippola, T. von Rauner, H. Siren, R. Sepponen, Helsinki University of Technology, FINLAND

14:50 Paper 33.3. Power Electronic Subassemblies with Increased Functionality Based on Planar Sub-Components

J.T. Strydom Rand Afrikaans University, SOUTH AFRICA, J.A. Ferreira, Delft University of Technology, THE NETHERLANDS, J.D. van Wyk, Virginia Polytechnic Institute and State University, USA, E. Waffenschmidt, Phillips Research Laboratories, THE NETHERLANDS

15:15 Paper 33.4. A Low-Profile Power Converter Using Coreless PCB Power Transformer Shielded with Ferrite Polymer Composite

S.C. Tang, S.Y.R. Hui, H. Chung, City University of Hong Kong, HONG KONG

15:40 BREAK**16:10 Paper 33.5. Thermal Fatigue Resistance Evaluation of Solder Joints in IGBT Power Modules for Traction Applications**

J.-M. Thebaud, E. Woïrgard, C. Zardini, Universite Bordeaux 1 – ENSERB, FRANCE, K.-H. Sommer, EUPEC GmbH, GERMANY

16:35 Paper 33.6. Exact Inductive Parasitic Extraction for Analysis of IGBT Parallel Switching Including DCB-Backside Eddy Currents

B. Gutschmann, University of Bremen, GERMANY, P. Mourick, Semikron Elektronik GmbH, GERMANY, D. Silber, University of Bremen, GERMANY

17:00 Paper 33.7. PCB Rogowski Coils for High DI/DT Current Measurement

N. Karrer, ETH, SWITZERLAND, P. Hofer-Noser, Atlantis Solar Systems, SWITZERLAND, D. Henrard, LEM SA, SWITZERLAND

SESSION 34. ACTIVE POWER FILTERS

Thursday June 22, 2000 at 14:00 - Cairnes Theatre

Chairs: W. Dunford, University of British Columbia, CANADA

E. Da Silva, Federal University of Paraiba, BRAZIL

14:00 Paper 34.1. Stability Analysis of a Series Active Filter Integrated with a Double-Series Diode Rectifier

S. Srianthumrong, H. Fujita, H. Akagi, Okayama University, JAPAN

14:25 Paper 34.2. Effects of Supply Voltage Non-Idealities on the Behavior of an Active Power Conditioner for Cogeneration Systems

D. Casadei, G. Grandi, University of Bologna, ITALY

14:50 Paper 34.3. Four Switch Three Phase Active Filter With Reduced Current Sensors

G. Joos, S. Chen, Concordia University, CANADA

15:15 Paper 34.4. A Novel Scheme for Mitigation of Line Current Harmonics in Three-Phase Distribution Systems

M. Ashari, C.V. Nayar, S. Islam, CRESTA, Curtin University of Technology, AUSTRALIA

15:40 BREAK

16:10 Paper 34.5. A Hybrid Three-Phase Parallel Active Power Filter Operation with PCC

W.-C. Lee, D.-S. Hyun, Hanyang University, KOREA, T.-K. Lee, Hankyong National University, KOREA

16:35 Paper 34.6. Generalized Topologies of Single-Stage Input-Current-Shaping Circuits

L. Huber, Delta Products Corp., USA, J. Zhang, Virginia Polytechnic Institute and State University, USA, M.M. Jovanovic, Delta Product Corporation, USA, F.C. Lee, Virginia Polytechnic Institute and State University, USA

17:00 Paper 34.7. Three-Phase High Power Factor Rectifier Based on the Third Harmonic Current Injection with Passive Resistance Emulation

P. Pejovic, University of Belgrade, YUGOSLAVIA

SESSION 35. MODELLING OF APPLICATIONS

Thursday June 22, 2000 at 14:00 - D'Arcy Thomson Theatre

Chairs: S.B. Leeb, M.I.T., USA

M. Egan, University College Cork, IRELAND

14:00 Paper 35.1. Large-Signal Modeling of a Single-Switch Power Factor Correction Converter

G. Zhu, C. Iannello, I. Batarseh, University of Central Florida, USA, P. Kornetzky, AN-Institut Der TU Illemanu, GERMANY

14:25 Paper 35.2. Lamp Modeling for Design of Dimmable Electronic Ballast

A.T.K. Ng, W.-H. Ki, P.K.T. Mok, J.K.O. Sin, HKUST, HONG KONG

14:50 Paper 35.3. Dynamic Interaction of High Frequency Electronic Ballasts and Fluorescent Lamps

S. Gluzman, S. Ben-Yaakov, Ben-Gurion University, ISRAEL

15:15 Paper 35.4. Stability Analysis of a Digitally-Controlled Battery Plant

V. J. Thottuvelil, Bell Laboratories, Lucent Technologies, USA, G. C. Verghese, Massachusetts Institute of Technology, USA

15:40 BREAK

16:10 Paper 35.5. A New ZVS Two-Output Series-Resonant Inverter for Induction Cookers Obtained by a Synthesis Method

F. Monterde, P. Hernandez, J.M. Burdio, Universidad de Zaragoza, SPAIN, J.R. Garcia, BHS Balay, S.A., SPAIN, A. Martinez, Universidad de Zaragoza, SPAIN

16:35 Paper 35.6. Design and Simulation of a Stand-alone Wind-Diesel Generator with a Flywheel Energy Storage System to Supply the Required Active and Reactive Power

I.J. Iglesias, L. García-Tabarés, A. Agudo, CEDEX, SPAIN, I. Cruz, L. Arribas, Ciemat, SPAIN

17:00 Paper 35.7. PWM-Control of Multi-Level Voltage-Source Inverters

M. Veenstra, A. Rufer, EPFL, SWITZERLAND

SESSION 36. ADVANCE CONTROL

Thursday June 22, 2000 at 14:00 - Larmor Theatre

Chairs: C. Quinn, Artesyn Technologies, USA
D. Staffiere, Staffiere Consulting Services, USA

- 14:00** **Paper 36.1. H-infinity Loop-shaping Controller Designs for the Single-Phase UPS Inverters**
T.-S. Lee, S.-J. Chiang, J.-M. Chang, National Lien-Ho College of Technology and Commerce, TAIWAN
- 14:25** **Paper 36.2. Comparative Analysis of ACC Control Loops of DC-DC Converters by Means of Robust Parametric Control Theory**
E. Figueres, G. Garcerá, M. Pascual, Universidad Politécnica de Valencia, SPAIN
- 14:50** **Paper 36.3. Systematic Approach to Robust Nonlinear Voltage Control of Buck/Boost Converter**
S. Sasaki, T. Inoue, National Defense Academy, JAPAN
- 15:15** **Paper 36.4. Non-Linear Passive Control with Inductor Current Feedback for UPS Inverter**
G. Alarcón, V. Cárdenas, S. Ramírez, N. Visairo, C. Núñez, M. Oliver, CENIDET, MEXICO, H. Sira-Ramírez, Universidad de los Andes, VENEZUELA
- 15:40** **BREAK**
- 16:10** **Paper 36.5. On Non-Linear Observers Applied to Three-Phase Voltage Converters**
A. Sarinana, S. Bacha, G. Bornard, Laboratoire d'Automatique de Grenoble, FRANCE
- 16:35** **Paper 36.6. Linear Switcher Combination with Novel Feedback**
P. Midya, Motorola, USA
- 17:00** **Paper 36.7. Control Circuit Design of the L-LC Resonant Inverter for Induction Heating**
J.M. Espí, J. Maicas, A.E. Navarro, J. Ejea, University of Valencia, Spain, SPAIN

SESSION 37. CONVERTERS II

Friday June 23, 2000 at 9:00 - O'Flaherty Theatre

Chairs: K. Fellhoelter, Lucent Technologies, USA
D. Perreault, M.I.T., USA

- 09:00** **Paper 37.1. A High Efficiency DC-UPS with PFC**
E. Rodríguez, ITC, MEXICO, H. Visairo, J. Arau, CENIDET, MEXICO
- 09:25** **Paper 37.2. A New Family of Single Stage High-Power-Factor AC/DC Converters**
O. Lopez, L. Garcia de Vicuña, J. Matas, M. Castilla, Universidad Politecnica de Cataluña, SPAIN
- 09:50** **Paper 37.3. Influence of Commutation Dead Time on the Steady-State and Dynamic Characteristics of Fixed-Pattern Rectifiers**
J. Ghijselen, A. Van den Bossche, J. Melkebeek, RUG-ELMAPE, BELGIUM
- 10:15** **Paper 37.4. Power Distribution in Pulse-Density Modulated Waveforms**
H. Calleja, CENIDET, MEXICO, J. Pacheco, ININ, MEXICO
- 10:40** **BREAK**
- 11:10** **Paper 37.5. A Quasi-Passive Modulation Circuit Improving the Current Waveform of Conventional Rectifiers**
J. Xu, Université du Québec a Trois-Rivières, CANADA, A. Charette, LTEE-HYDRO QUEBEC, CANADA, V. Rajagopalan, Université du Québec a Trois-Rivières, CANADA
- 11:35** **Paper 37.6. Design Optimisation of a New Active Resonant Snubber for High Power IGBT Converters**
F.W. Combrink, H. de T. Mouton, J.H.R. Enslin, University of Stellenbosch, SOUTH AFRICA
- 12:00** **Paper 37.7. A Modified Discrete Control Law for UPS Applications**
J.R. Pinheiro, H.A. Grudling, C. Rech, Federal University of Santa Maria, BRAZIL

SESSION 38. LOW-POWER DC-DC CONVERTERS AND SYNCHRONOUS RECTIFICATION

Friday June 23, 2000 at 9:00 - Kirwan Theatre

Chairs: I. Cohen, Lambda Electronics, USA

N. Barry, Cork Institute of Technology, IRELAND

09:00 Paper 38.1. High-Power-Density MHz-Switching Monolithic DC-DC Converter with Thin-Film Inductor

Y. Katayama, S. Sugahara, H. Nakazawa, M. Edo, Fuji Electric Corporate Research and Development, Ltd., JAPAN

09:25 Paper 38.2. Analysis of Charge Pumps Using Charge Balance

W.-C. Wu, R.M. Bass, Georgia Institute of Technology, USA

09:50 Paper 38.3. Charge Pump with ACTIVE-CYCLE Regulation -Closing the Gap between Linear- and Skip-Modes

E. Bayer, H. Schmeller, Texas Instruments, GERMANY

10:15 Paper 38.4. Analysis of the Novel Soft-Switching DC-DC Converter with Low Output Voltage

H. Watanabe, Shindengen Electric Mfg. Co., Ltd., JAPAN, H. Matsuo, Nagasaki University, JAPAN, H. Hatakeyama, Shindengen Electric Mfg. Co., Ltd., JAPAN

10:40 BREAK

11:10 Paper 38.5. A High Efficiency Voltage Regulator Module with Single Winding Self-Driven Synchronous Rectification

P. Alou, P. Perez-Bedmar, J.A. Cobos, J. Uceda, Universidad Politecnica de Madrid, SPAIN, M. Rascon, Alcatel, SPAIN

11:35 Paper 38.6. Efficiency Improvement for Forward DC-DC Converter Employing Synchronous Rectifier

M. Jinno, W.-L. Wu, I-Shou University, TAIWAN

12:00 Paper 38.7. A Series-Resonant DC/DC Converter with Asymmetrical PWM and Synchronous Rectification

G. Moschopoulos, S. Mangat, P. Jain, Concordia University, CANADA

SESSION 39. SWITCHED/RELUCTANCE MOTOR DRIVES AND PARAMETER ESTIMATION

Friday June 23, 2000 at 9:00 - Cairnes Theatre

Chairs: T. O'Gorman, Motorola, USA

R. De Doncker, RWTH Aachen, GERMANY

09:00 Paper 39.1. Limitations of Inverter Topologies for Two-Phase Switched Reluctance Machines with Emphasis on Starting and High-Speed Operation

J.E. Fletcher, R. Hamdy, B.W. Williams, S.J. Finney, Heriot-Watt University, UK

09:25 Paper 39.2. Sensorless Switched Reluctance Motor Drive with Torque Ripple Minimization

H.S. Ooi, T.C. Green, Imperial College, London, UK

09:50 Paper 39.3. Critical States in Generating Mode of Switched Reluctance Machines

M. Menne, R. Inderka, R.W. DeDoncker, ISEA/RWTH Aachen, GERMANY

10:15 Paper 39.4. Modeling and Analysis of Chaotic Behavior in Switched Reluctance Motor Drives

J.H. Chen, K.T. Chau, Q. Jiang, C.C. Chan, University of Hong Kong, HONG KONG

10:40 BREAK

11:10 Paper 39.5. Quasi Time-Invariant Parameter Modeling and Control of Unbalanced Induction Machines

C.B. Jacobina, A.M.N. Lima, Dee-Univ. Federal da Paraiba, BRAZIL, J.E. Chaves Fl., UFAM, BRAZIL

11:35 Paper 39.6. Electrical Parameter Estimation Considering the Saturation Effects in Induction Machines

Z.M.P. Assis, Pontifical Catholic University of Minas Gerais, BRAZIL, P.F. Seixas, Federal University of Minas Gerais, BRAZIL

12:00 Paper 39.7. Sensorless Control of Switched Reluctance Motor Drive with Self-Measured Flux-Linkage Characteristics

D. Panda, V. Ramanarayanan, Indian Institute of Science, INDIA

SESSION 40. SEMICONDUCTOR DEVICES II

Friday June 23, 2000 at 9:00 - D'Arcy Thomson Theatre

Chairs: A.Q. Huang, Virginia Polytechnic Institute and State University, USA

J. Flannery, PEI Technologies, IRELAND

- 09:00** **Paper 40.1. Smart Power Devices in Soft Switching Applications**
A. Galluzzo, M. Melito, S. Musumeci, STMicroelectronics, Catania, ITALY, A. Raciti, University of Catania, ITALY
- 09:25** **Paper 40.2. Integrated Schottky Diodes in BCD5 Technology for High Frequency Soft Switched Power Converters**
E. Dallago, G. Sassone, University of Pavia, ITALY, E. Novarini, A. Gola, ST Microelectronics, ITALY
- 09:50** **Paper 40.3. Study of the Short-Circuit Behavior of Homogeneous IGBTs Using Experimental Results and a Physics Based SPICE-Model**
M. Cotoroge, A. Claudio, J. Aguayo, CENIDET, MEXICO
- 10:15** **Paper 40.4. An Estimation Method of the Channel Temperature of Power MOS Devices**
D. Bergogne, B. Allard, H. Morel, CEGELY, INSA-Lyon, FRANCE
- 10:40** **BREAK**
- 11:10** **Paper 40.5. Performance Characterization of MOS and Bipolar Devices for the Development of Efficient and Reliable Electronic Ballast**
A. Mulay, K. Shenai, University of Illinois at Chicago, USA
- 11:35** **Paper 40.6. Influence of Gate Internal Impedance on Losses in a Power MOS Transistor in High Frequency ZVS Mode**
S. Lefebvre, F. Costa, LESIR, FRANCE, F. Miserey, MCC/CNAM, FRANCE
- 12:00** **Paper 40.7. Thermal Impedance Determination of the Die Attach for Power Devices Using a Transient Cooling-Curve Measurement**
M. Ludwig, J. Flannery, A. Gaedke, S.C. O'Mathuna, PEI Technologies, NMRC, IRELAND

SESSION 41. MAGNETIC MODELLING

Friday June 23, 2000 at 9:00 - Larmor Theatre

Chairs: A. Lotfi, Bell Laboratories, USA

T. O'Donnell, PEI Technologies, IRELAND

- 09:00** **Paper 41.1. Converter and Inductor Design for Fast-Response Microprocessor Power Delivery**
G.J. Mehas, Intel Corporation, USA, K.D. Coonley, C. R. Sullivan, Dartmouth College, USA
- 09:25** **Paper 41.2. A Transformer with Integrated Capacitor in a Crosswise Connected Configuration : Measurements and Calculations of its Behaviour**
E. Waffenschmidt, Philips Research, GERMANY
- 09:50** **Paper 41.3. The Layer Copper Factor, Although Widely Used and Useful, Has No Theoretical Base**
F. Robert, P. Mathys, Universite Libre de Bruxelles, BELGIUM, J.-P. Schauwers, Mitra Power Systems, BELGIUM
- 10:15** **Paper 41.4. Two-Dimensional Calculation of Winding Losses in Transformers**
M. Albach, University Erlangen-Nürnberg, GERMANY
- 10:40** **BREAK**
- 11:10** **Paper 41.5. Comparison of Experimental Techniques for Determination of Stray Capacitances in High Frequency Transformers**
H. Lu, J. Zhu, V.S. Ramsden, University of Technology, Sydney, AUSTRALIA
- 11:35** **Paper 41.6. Capacitance Model for Magnetic Devices**
T. Duerbaum, Philips, Research, GERMANY
- 12:00** **Paper 41.7. Generic Operational Characteristics of Piezoelectric Transformers**
G. Ivensky, I. Zafrany, S. Ben-Yaakov, Ben-Gurion University, ISRAEL

CONFERENCE AT A GLANCE

SUNDAY, JUNE 18		Time	Location
Tutorial 1	Advanced DSP-Based Motor Control Concepts	9:00-12:00	Cairnes
Tutorial 2	A Building-Block Approach to Switch-Mode Power Electronics	9:00-12:00	D'Arcy Thomson
Tutorial 3	Efficient Low Output Voltage Power Conversion Techniques	14:00-17:00	Cairnes
Tutorial 4	Three-Phase PWM Rectifier Systems	14:00-17:00	D'Arcy Thomson
Registration Desk open		15:00-19:00	Room 203
Welcome Reception		19:00-21:00	University Bar
MONDAY, JUNE 19			
Session 1	Official Opening and Plenary Session	9:00-10:40	O'Flaherty, D'Arcy Thomson
Session 2	PWM Techniques I	11:10-12:25	O'Flaherty
Session 3	Integration and Packaging I	11:10-12:25	Kirwan
Session 4	Induction Motor Drives	11:10-12:25	Cairnes
Session 5	Semiconductor Devices I	11:10-12:25	D'Arcy Thomson
Session 6	Control of Distributed Systems	11:10-12:25	Larmor
Session 7	PWM Techniques II	14:00-17:25	O'Flaherty
Session 8	Soft Switching DC-DC Converters	14:00-17:25	Kirwan
Session 9	Adjustable Speed Drives	14:00-17:25	Cairnes
Session 10	Modelling of Devices And Related Issues	14:00-17:25	D'Arcy Thomson
Session 11	Magnetics Technology	14:00-17:25	Larmor
TUESDAY, JUNE 20			
Session 12	Power Factor Correction Circuits I	9:00-12:25	O'Flaherty
Session 13	Control and Modelling of DC-DC Converters	9:00-12:25	Kirwan
Session 14	Vector Control and Direct Torque Control	9:00-12:25	Cairnes
Session 15	Power Quality	9:00-12:25	D'Arcy Thomson
Session 16	Transportation Applications	9:00-12:25	Larmor
Session 17	Power Factor Correction Circuits II	14:00-17:25	O'Flaherty
Session 18	Soft Switching and Resonant DC-DC Converters	14:00-17:25	Kirwan
Session 19	Multilevel Converters and High Power Applications	14:00-17:25	Cairnes
Session 20	Modelling of DC to DC Converters	14:00-17:25	D'Arcy Thomson
Session 21	Power Quality and Motion Control	14:00-17:25	Larmor
RAP Sessions	"Packaging is Your Only Man"	19:00-21:00	O'Flaherty
	Computer Design Aids: Boon or Bane?	19:00-21:00	D'Arcy Thomson
	Line-Harmonics Regulation - Why (or Why Not) and How?	19:00-21:00	Cairnes
WEDNESDAY, JUNE 21			
Session 22	Low Power Applications	9:00-12:25	O'Flaherty
Session 23	PWM DC-DC Converters	9:00-12:25	Kirwan
Session 24	Sensorless Drives	9:00-12:25	Cairnes
Session 25	EMI-EMC	9:00-12:25	D'Arcy Thomson
Session 26	Utility Applications	9:00-12:25	Larmor
Afternoon Tours		13:45-18:00	
Conference Banquet		19:30-	Corrib Great Southern Hotel
THURSDAY, JUNE 22			
Session 27	Converters I	9:00-12:25	O'Flaherty
Session 28	PWM and High Power DC-DC Converters	9:00-12:25	Kirwan
Session 29	Advance Drive and Control Techniques	9:00-12:25	Cairnes
Session 30	Harmonics and Active Filters	9:00-12:25	D'Arcy Thomson
Session 31	Distributed Resources	9:00-12:25	Larmor
Session 32	Soft Switching Techniques	14:00-17:25	O'Flaherty
Session 33	Integration and Packaging II	14:00-17:25	Kirwan
Session 34	Active Power Filters	14:00-17:25	Cairnes
Session 35	Modelling of Applications	14:00-17:25	D'Arcy Thomson
Session 36	Advance Control	14:00-17:25	Larmor
Concert		20:00-21:30	St. Nicholas' Coll. Church
FRIDAY, JUNE 23			
Session 37	Converters II	9:00-12:25	O'Flaherty
Session 38	Low-Power DC-DC Converters and Synchronous Rectification	9:00-12:25	Kirwan
Session 39	Switched/Reluctance Motor Drives and Parameter Estimation	9:00-12:25	Cairnes
Session 40	Semiconductor Devices II	9:00-12:25	D'Arcy Thomson
Session 41	Magnetic Modelling	9:00-12:25	Larmor
Awards Luncheon		12:30-14:30	Main Restaurant