POWER ELECTRONICS SOCIETY NEWSLETTER

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Announcments: INTELEC, VPPC, APEC2009

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From The Editor

John M. Miller

Summer has arrived! Amazing how fast this year is going and we are already into the third issue for 2008! In this issue our readers will find a pair of excellent reports from our German chapter on recent meetings held in Heidelberg and Magdeburg. Our thanks go to Dr. Omid Forati Kashini, public relations chair of this joint chapter, for the excellent reports. The Heidelberg presentations covered the application of ac-drives in press machines and print media, including ink control. Several presentations at the Magdeburg meeting discussed the facilities available to students at local universities. Note also that the IEEE Joint IAS/PELS/IES German Chapter has been granted the IEEE-PELS Best Chapter Award 2008, which was presented during the IEEE 39th Power Electronics Specialists Conference (PESC '08) in Rhodes, Greece. Please join me in offering our congratulations to Dr. Kashini and all the members of this very active chapter. Kudos to all.

Speaking of congratulations, we also acknowledge Dr. Praveen Jain, Queen's University, as the recipient of a $5.5M award from the Ontario Research Fund to his Energy and Power Electronics Applied Research Laboratory project "Greenhouse Gas Emission Free and Energy Efficient Power Technology for Information Systems."

And, speaking of energy efficiency we include in this issue an update from the Center for Power Electronic Systems (CPES) at Virginia Tech on recent activities to modify a research laboratory to incorporate emerging and alternative energy technologies and power management into a living lab for future energy sustainable home and office.

Finally, and most relevant and timely, is a report from our Society President, Prof. Akagi on the effect of no-shows at PELs conferences and events. Also, in his president's column, Prof. Akagi notes that this past 39th PESC® was the final meeting and that PESC will no longer appear on conference listings, instead, it is replaced by the Energy Conversion Congress and Exposition (ECCE) starting up in 2009. Please read about these changes in this issue.

As always, this newsletter can only be as up to date and relevant as you, the members of PELs make it. PELs welcomes all contributions on events, awards, news items and topics of interest. Please continue to forward your contributions to the editor or to any of the contacts listed on the masthead. Have a very enjoyable summer 2008.

John M. Miller, EIC
pelsnews@ieee.org

Courtesy of CPES-Virginia Tech 30 Suntech STP170S-24/Ab-1, monocrystalline, solar panels in three arrays of 10 panels each currently installed on the rooftop of Whittemore Hall, home of CPES-VT.

President's Message

Dear PELS members:

I attended the 39th IEEE PESC (Power Electronics Specialists Conference) held at the Island of Rhodes, Greece, during June 15-19, 2008. This is the flagship conference of those conferences/workshops sponsored or co-sponsored by the Power Electronics Society. Fortunately, I had three faces at the conference; that of Society President, as paper presenter, and as session chair. I really enjoyed the technical sessions and social events because the conference was very successful and fruitful in terms of not only paper number, paper quality, attendee number, and conference facilities and services but also warm hospitality given by the conference staff.

On behalf of the Power Electronics Society, I would like to congratulate and appreciate General Conference Chair, Stefanos Manias, and Technical Program Chair, Vassilios Agelidis for having led a "first-class" international technical conference that gathered more than 800 attendees and 763 papers in oral and poster presentations.

You may ask a question: How does one judge the 2008 PESC to be the "first-class" conference? One of the answers may be the "quality" of papers presented at the conference. Of course, you can evaluate the quality of some papers related to your research field in power electronics, but no one could discuss the "overall quality" of all the papers in power electronics technologies ranging from several watts to several gigawatts. Thus, in my opinion, one of the simplest ways is to evaluate the so-called "no-show rate." Here, no-show means that neither author nor co-author of a paper included in the conference CD-ROM makes oral or poster presentation at the conference. As I described in the last president's message in the April issue this year, the IEEE TAB (Technical Activity Board) started investigating and discussing how to reduce no-show papers at IEEE conferences. After the conference, Prof. Vassilios Agelidis told me that the number of no-show papers was 36 (19 in oral and 17 in poster sessions). This means that the no-show rate was 4.7% (=36/763). It was an extremely low rate at such a large international technical conference where 763 original papers, excluding tutorials, were presented exclusively. Together with the conference staff, we are proud of the 2008 PESC achievement, and so we believe it to be a "first-class" international technical conference.

I did not encounter any no-show paper among the oral sessions I attended, except for one paper that was presented by another professor than the authors. The designated professor made an excellent presentation as if he were one of the authors! I also found out that several posters were not exhibited in each of three poster sessions, but the number is too small to be considered as an issue of no-show papers.

Attending the 2008 PESC, I observed that oral presentations by young professors and engineers improved significantly, compared to those in ten years before. However, the following distinct difference exists between past and present conferences. A technical conference organizer used to publish printed proceedings including all the papers presented, so that the participants in oral sessions were able to refer to the paper easily and quickly, while the speaker was talking. Nowadays, the participants look at power-point slides the speaker uses, and listen to what the speaker says, because they have no printed papers in hand. This indicates that presentation skills are getting much more important than in the past. Please keep it in mind, and try to make better presentations not only for yourself but also for the participants who want to learn the latest technical knowledge and information from you.

When I was a young assistant professor at the Nagaoka University of Technology, my mentor professor, Akira Nabae gave me the following advice on presentation: "First of all, you should realize that few participants in your session have read your paper. You should give up trying to have all the participants completely understand your paper at a short (20-minite) presentation. Instead, you should strive to have them interested in your paper, putting emphasis on the background, motivation, idea/concept and result, or more simply on what is new. If some of the participants read your paper carefully and fully later on, your presentation would be so successful that it would remind them of your name and face as well as your paper." I still remember his effective advice vividly. I often give the same advice to my graduate students who will present papers at technical conferences for the first time.

The name, "PESC" will disappear from future IEEE conferences. However, the frontier spirit, as well as the brilliant tradition and legacy, will succeed to the inaugural IEEE Energy Conversion Congress and Exposition (ECCE) that will be held in San Jose, California, USA, September 20-24, 2009. This new conference combines PESC with the Industrial Power Conversion Systems Department (Electrical Machines Committee, Industrial Drives Committee, Industrial Power Converter Committee, and the Power Electronics Devices and Components Committee) of the IEEE Industry Applications Society Annual Meeting.

I regret to inform you that Lee Myers will step down from the PELS Administrative position at the end of June in 2008. (When you read this article, she will have retired.) She has worked for the Power Electronics Society for more than twenty years, together with the late Mr. Bob Myers. On behalf of the Society, I would like to express our utmost appreciation and recognition to Lee for her long-term sincere services and dedications to the Society. We will never forget warm smiles on her face!

Finally, I would like to extend a warm welcome to Donna Florek, our new Sr. Administrator. Since the end of April 2008, Donna has been working for our Society, intended for carrying out a seamless transition. Before joining us, Donna had worked for the Power & Energy Society (PES) for seven years at the IEEE Head Office in Piscataway, New Jersey. She has a vast knowledge about the PES, and gains experience from the IEEE. Her rich knowledge and experience will help our Society not only to increase our membership but also to enhance globalization.

Thanks Lee, and welcome Donna!

Hirofumi Akagi 赤木泰文

Hirofumi (Hiro) Akagi
IEEE PELS President
Professor, Tokyo Institute of Technology
E-mail: akagi@ee.titech.ac.jp

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IEEE TRANSACTIONS ON POWER ELECTRONICS

Call for Papers

Special Issue on Modeling and Advanced Control in Power Electronics, 2009

Scheduled Publication Time: November 2009

Prospective authors are invited to submit original contributions or survey papers for review for publication in this special issue. Topics of interest include (but are not limited to):

- Reduced-order and behavioral modeling of devices, components, circuits, and systems
- Integrated electro-magneto-thermal modeling; EMI modeling, multilevel and multi-physics modeling
- Model validation, model certification; model identification, model development tools
- Parallel and distributed simulation of complex power electronic systems; multilevel simulation
- Hardware-in-loop simulation, mixed-signal simulation, interactive simulation; virtual prototyping
- Digital and mixed-signal control of high-frequency converters; digital pulse-width modulation
- Geometric, ripple-based, and other nonlinear control methods for power converters
- Modular converter control, current and voltage sharing control; sensorless and adaptive control
- Large- and small-signal methods for complex dc, ac, and hybrid dc/ac power electronic systems
- Modeling and control of mobile and autonomous power electronic systems
- Modeling and control of renewable energy systems

All manuscripts must be submitted through Manuscript Central at http://mc.manuscriptcentral.com/tpel-ieee. Submissions must be clearly marked "Special Issue on Modeling and Advanced Control in Power Electronics, 2009" on the cover page. When uploading your paper, please indicate, under step 4 – *Details & Comments*, that it is for the "Special Issue on Modeling and Advanced Control in Power Electronics, 2009." Refer to http://www.pels.org for general information about electronic submission through Manuscript Central. Manuscripts submitted for the special issue will be reviewed separately and will be handled by the guest editorial board noted below.

Deadline for Submission of Manuscript: February 28, 2009

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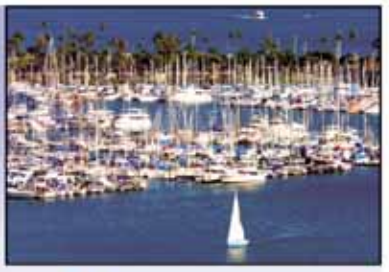

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SMART GRID AND POWER DELIVERY. Power delivery issues to support sustainable energy, Smart Grid, grid control with high penetration of renewables, real-time-pricing and impact on grid operation, microgrids, delivering "green" electrons, energy storage, carbon cap and trade or carbon tax, market incentives, grid solutions for developing countries.

REPLACING FOSSIL FUEL CONSUMPTION AT THE LOAD POINT. Hybrid and plug-in hybrid vehicles, impact of PHEVs on grid management and control, electric vehicles and energy storage technologies, V2G technologies, fuel cell cars, heating and cooling loads, energy appliances, impact of carbon tax, solutions for developing countries.

REDUCING ENERGY CONSUMPTION. Lighting technologies (LED, OLED, other), improving energy efficiency in industrial, commercial and consumer use, reducing heat load in data centers, reducing per family energy demand, real-time pricing of electricity, creating markets for "green" electrons, smart homes, impact of carbon tax, solutions for developing countries.

Prospective authors should submit an abstract and digest for the paper totaling no more than five pages to the address shown below.

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IMPORTANT DATES

Digests Due:	July 31, 2008
Acceptance Notification:	Sept. 1, 2008
Final Papers Due:	Oct. 15, 2008

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Bill Schweber
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Between Schweber and Nass, they have compiled instructors from across the industry to present at this year's conference. **If you have any questions please contact Noel directly at nsanchez@techinsights.com or at 415.947.6379.**

We look forward to partnering with you for Embedded Power Conference 2008!

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IEEE Joint IAS/PELS/IES German Chapter meets in Heidelberg

Dr. Omid Forati Kashani

The first meeting of the IEEE Joint IAS/PELS/IES German Chapter in 2008 took place on 6th and 7th of March in Heidelberg, Germany. The host of the meeting was the Heidelberger Druckmaschinen AG, which is one of the biggest manufacturers and pioneers in the innovations of industrial press machines world wide. The first day of the meeting began with a get-together dinner party at Kulturbrauerei Heidelberg sponsored by Heidelberger Druckmaschinen AG. That was a good opportunity for the participants to talk and discus their fields of interests with each other in a friendly atmosphere.

The second day of the meeting began with the welcome presentations of the IEEE Joint IAS/PELS/IES German Chapter Chairman Prof. van der Broeck and Dr. Uwe Thessmann, Head of predevelopment, design and documentation department of the Heidelberger Druckmaschinen AG. In his presentation gave Dr. Thessmann some information about milestones in history and fields of activities of Heidelberger Druckmaschinen AG. Originally founded as a factory for manufacturing bells as well as casting and forging materials, mills and steam engines in the Palatine city of Frankenthal, Germany, in 1850 by Mr. Andreas Hamm, today the Heidelberger Druckmaschinen AG presents products and services in fields of prepress, press and post press such as cutting or folding.

In the second part of the presentations gave Dr. Bernard Beier, head of predevelopment department of Heidelberger Druckmaschinen AG, some information related to research and development in his department. Along side with the research and development e.g. in the fields of measuring techniques, design, sensors, acoustics and electrical drives the Heidelberger Druckmaschinen AG has its own Print Media Academy, where the customers become training for their press machines.

As the next lecturer Mr. Helmut Meyer, head of control platforms group of Heidelberger Druckmaschinen AG, presented some technical control aspects of the electrical drives in press machines developed in his group. For example he explained how the paper sheets were decelerated after printing process and before stacking on each other. Another presented aspects were for example the control of ink level in the printing process or attrition compensation of rubber blankets of cylinders in the offset-printing.

The last lecturer before coffee break was Dr. Hendrik Frank from Heidelberger Druckmaschinen AG. He presented the achievements in his project for a new system with linear drives. In the new concept the motions are done by segmented linear electrical machines – identical to the “Transrapid” maglev train – , which substitute the conventional drives with rotating machines.

After coffee break Prof. van der Broeck gave some information about the activities of the Chapter in 2007 and upcoming events in the IEEE-business part. Honoring the activities the IEEE Joint IAS/PELS/IES German Chapter will get the Best Chapter Award 2007 of IEEE Industrial Electronics Society together with IEEE Joint PELS/IAS/IES French Chapter. In regard to the upcoming events Prof. Andreas Lindemann from the Otto-von-Guericke University Magdeburg presented the invitations for the next Chapter meeting on 5th and 6th June in Magdeburg, Germany. The next meeting in Magdeburg will be a joint meeting with IEEE PES German Chapter and combined with the meeting of the

Meeting participants at Heidelberger Druckmaschinen AG

The audience listening to the lecturers at Heidelberger Druckmaschinen AG

German IEEE Student Branches organized by the Student Branch of the University Magdeburg.

As special lecturer invited by the IEEE Joint IAS/PELS/IES German Chapter Prof. Günther Brandenburg from the Technische Universität München presented some control aspects of electrical drives in industrial press machines specially in the field of Web Offset Presses, resulted from many years of research done by him and his team. He presented his mathematical model for Web Offset Press system and how he has analyzed it. He presented some results how the disturbances in the system were compensated in his control system.

After business lunch the participants had the opportunity to visit the Print Media Center of the Heidelberger Druckmaschinen AG. In this center there are many press machines, which give the customers the opportunity to see the function and the result of each type of press machine. For example the meeting participants could see how an offset press machine with multiple press stages practically works. The visiting ended with a short visit of Print Media Academy of Heidelberger Druckmaschinen AG, where the special arrangement of the escalators and a small pool on the floor should symbolize the stages of a press machine and ink.

After visiting the last lecture was presented by Dr. Eric Knopf the head of machine technique and pass quality field of Heidelberger Druckmaschinen AG. He presented the influence of vibrations of the press machines on the press quality and his achievements for reduction of these vibrations actively.

Continuing the activities of our Chapter in 2008 there is one more meeting in addition to the meeting in Magdeburg planed. For more information please visit our website at: http://www.ewh.ieee.org/r8/germany/ias-pels/index.html.

Dr. Omid FORATI KASHANI is Public Relations Chair of the IEEE Joint IAS/PELS/IES German Chapter
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IEEE Joint IAS/PELS/IES German Chapter meets in Magdeburg

Dr. Omid Forati Kashani

Continuing its meeting programs, the IEEE Joint IAS/PELS/IES German Chapter had its second meeting in 2008 on 5th and 6th of June in Magdeburg, Germany, together with IEEE PES German Chapter. The meeting had a special occasion merging with the IEEE German Student Branches meeting hosted by the Student Branch of the Otto von Guericke University of Magdeburg. Magdeburg is with more than 1200 years of history the capital of the German federal state Saxony-Anhalt and home of some famous personalities such as Otto von Guericke, who became well-known because of his researches in the field of vacuum. The hosts of the meeting were the Otto von Guericke University of Magdeburg and the wind turbine manufacturer Enercon GmbH.

The IEEE Joint IAS/PELS/IES German Chapter has planed a meeting on 16th and 17th October 2008 at Dr. Fritz Faulhaber GmbH & Co. KG in Schönaich, Germany. For more information please visit our website at: http://www.ewh.ieee.org/r8/germany/ias-pels/index.html.

The first day of the meeting began with a tour in the old city center of Magdeburg started with the historical Magdeburg Cathedral, the first gothic cathedral built on German soil. On the route to the university campus some historically and architecturally important sites and buildings were visited while a well-informed city guide gave informative explanations about them.

The city tour ended at the university campus, where the meeting participants had the opportunity to visit the laboratories of the Institute of Electrical Power Systems at the Otto von Guericke University of Magdeburg. After a welcome speech presented by the head of Power Electronics group Prof. Andreas Lindemann, the participants visited various test benches in the institute, where they became some information about them. For example they visited test benches in the field of fuel cells, contactless energy transfer as well as robotics.

The meeting participants visiting laboratories at the Institute of Electrical Power Systems

After laboratory visits the IEEE Joint IAS/PELS/IES German Chapter Chairman Prof. van der Broeck gave in the IEEE-business part of the meeting some information and news related to the Chapter e.g. about next planed chapter meetings and chapter board election for the next two years period. Honoring its activities the IEEE Joint IAS/PELS/IES German Chapter has been granted the IEEE-PELS Best Chapter Award 2008, which will be handed over during the IEEE 39th Power Electronics Specialists Conference (PESC 08) in Rhodes, Greece.

The first day of the meeting ended with a dinner party at the historical defense tower of Lukasklause, where the participants had the opportunity to discus their fields of interests in a friendly atmosphere. During the dinner party a group of students from RWTH Aachen University and University of Applied Sciences Cologne, Germany, presented their report about their competition and success in the IEEE International Future Energy Challenge 2007 of PELS. They arranged a test bench so that the participants could view and test their battery charger, which they had developed and built for the competition.

The second day of the meeting began with the welcome presentation of the Rector of the Otto van Guericke University of Magdeburg Prof. Klaus Erich Pollmann. As a merger of the existing Technical University, the Teacher Training College and the Medical School the Otto von Guericke University of Magdeburg was founded in 1993. Although the Otto von Guericke University of Magdeburg is among the youngest universities in Germany, with 9 faculties and almost 13000 students it is becoming more and more important as a center for education and research.

In the second presentation Prof. Zbigniew A. Styczynski, the head of Electric Power Network and Renewable Energy Sources group of the Institute of Electrical Power Systems and past dean of the Faculty of Electrical Engineering and Information Technology of the Otto von Guericke University of Magdeburg, introduced the faculty and its activities.

In the technical part of presentations Mr. Thomas Schallschmidt, Mr. Sebastian Schulz and Mr. Chris Heyde from the Institute of Electrical Power Systems Systems at the Otto von Guericke University of Magdeburg gave some information about their projects in their groups. Mr. Schallschmidt presented his research results developing and testing of a vertical magnetic bearing for heavy rotary tables. In the second technical presentation Mr. Schulz explained his research field about contactless energy transfer using a matrix converter with resonant load. Mr. Heyde introduced his field of research about dynamic security and protection assessment in power systems. As an invited lecturer from industry Dr. Herbert Gambach from Siemens AG gave some information about modular multilevel converters, which are used for High Voltage Direct Current (HVDC) applications in Siemens AG.

The audience listening to the lecturers at Otto von Guericke University of Magdeburg

Meeting participants in the Enercon GmbH site

After a short break the meeting participants started for the site of Enercon GmbH in Magdeburg, where they were welcome by the site managing director Mr. Volker Ziem. In his welcome speech Mr. Ziem gave some information about Enercon GmbH and its activities in the site. As the second lecturer Ms. Ruth Brand from Enercon GmbH presented a short history of the company as well as some technical information about wind turbines manufacturing in Enercon GmbH. Manufacturing wind turbines with up to 6 MW rated power Enercon GmbH has the most market share in Germany and a meaningful market share worldwide. Ms. Brand ended her presentation with a report about the situation of wind power in Germany. After presentations the meeting participants had the opportunity to visit production lines for rotor blades and electrical machines in the site.

Continuing the activities of our Chapter in 2008 there is a meeting on 16th and 17th October at Dr. Fritz Faulhaber GmbH & Co. KG in Schönaich, Germany, planed. For more information please visit our website at: http://www.ewh.ieee.org/r8/germany/ias-pels/index.html.

Dr. Omid FORATI KASHANI is Public Relations Chair of the IEEE Joint IAS/PELS/IES German Chapter
omid.foratikashani@ieee.org

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The IEEE International Electric Machines and Drives Conference provides an international forum for sharing experience, new ideas, and developments in design, operation, analysis, and practical application and optimization of electric drive systems and their components. IEMDC is a venue for users, designers and manufacturers, and analysts of electric machines and drives and their related power electronics and controls. The conference is jointly sponsored by the IEEE Power Engineering, Industrial Electronics, Industry Applications, and Power Electronics Societies.

In addition to the subjects identified above, the conference will have plenary presentations by recognized experts to highlight various aspects of electric machines and drives, such as automotive applications, renewable energy applications, permanent magnet motor drive systems, fault tolerant operation and survivability, sensorless methods, and turbogenerator operation and maintenance. Papers addressing these topics are encouraged.

Information for Authors

Authors wishing to submit papers are invited to submit an abstract of 200 words single spaced and a digest of five pages, including text, tables, and figures, at the conference website: http://www.iemdc2009.org. The style for the abstract, digest and the final version will be posted on the website. The Abstract and Digest should be in a single-column pdf format in 12 point serif text, such at Times New Roman and double spaced on either A4 or US letter-size pages. These format requirements are necessary for the peer review stage. Contact information for the corresponding author should be indicated on the abstract. No author information should appear on the Digest. Submissions should indicate a preference for oral or poster presentation in case of acceptance however, the final decision on the presentation format will be decided by the technical program committee. All submissions will be made through a web-based system

Acceptance notification will contain instructions for final paper preparation.

Registration and payment of fees by at least one author is required for inclusion in the conference proceedings.

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Conference Record

The papers presented during the conference will be posted on IEEE Xplore and be cited in EI (Engineering Index).

Important Dates

Submission of Abstracts and Digests November 30, 2008
Notification of Acceptance January 16, 2009
Submission of Final Papers March 2, 2009

24th Annual IEEE Applied Power Electronics Conference and Exposition
February 15th–February 19th, 2009 at the Marriott Wardman Park Hotel, Washington, DC.

Announcement and Call for Papers

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Papers of value to the practicing engineer are solicited in the following topic areas:

AC-DC and DC-DC Converters
Single- and Multi-Phase AC-DC Power Supplies, DC-DC Converters (Hard- and Soft-Switched)

Devices and Components
Semiconductor Devices, Magnetic Components, Capacitors, Batteries, Sensors, Interconnects, Device Integration

Manufacturing and Business Issues
Production Processes, Quality, Design for Manufacturability, Material Procurement, Supplier Qualification

Power Electronics for Utility Interface
Power Factor Correction, Power Quality, Electronics and Controls for Distributed Energy Systems

System Integration
Packaging, Thermal Management, EMI and EMC

Power Electronics Applications
Automotive and Transportation, Aerospace, renewable energy harvesting, Lighting, UPS, Power Generation and Transmission, Telecommunications, Military

Motor Drives and Inverters
AC and DC Motor Drives, Single- and Multi-Phase Inverters, PWM Techniques, sensor integration, Fault tolerant operation

Modeling, Simulation, and Control
Device, Component, Parasitics, Circuit and System, CAD /CAE Tools, Sensor and Sensor-less Control, Digital Control

Please note the following dates:

July 18, 2008	**Deadline for submission of digests**
October 3, 2008	**Notification that a paper was accepted or declined**
November 28, 2008	**Final papers and author registrations are due**

Digest Preparation: Prospective authors are asked to submit a digest explaining the problem that will be addressed by the paper, the major results, and how this is different from the closest existing literature. Papers presented at APEC must be original material and not have been previously presented or published. The principal criteria in selecting digests will be the usefulness of the work to the practicing power electronics professional. Reviewers also value evidence of completed experimental work. The digest must be double spaced in 10-point or larger font and a maximum of five pages including any abstract (optional), figures, and tables. Referencing within the digest should be done by number (i.e. [1]), but the list of references is to be submitted online separately from the digest. The digest should not include any author names or affiliations. For further details please visit www.apec-conf.org.

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Constructing Dynamic Average-Value Models of Power-Electronic-Based Systems

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***Abstract*—Computer modeling is a key tool for analysis and design of power-electronic-based systems used in many modern industrial and commercial products. Average-value modeling, wherein the effect of fast switching is neglected or averaged, has been widely used as an indispensable tool for the system-level time-domain studies and more importantly small-signal frequency-domain analysis. Instead of traditional analytical derivations, such system-level average-value models may be constructed numerically with the help of detailed switching simulations. Great results and accuracy have been demonstrated for practical DC-DC converters, generator-rectifier sets, and motor drive systems.**

***Index Terms* –average-value modeling, converters, large-signal model, motor drives, power electronics, small-signal model.**

I. INTRODUCTION

POWER electronics plays an increasingly important role in a growing number of industrial and commercial products and applications that use electric energy on large and small scales [1]. This field has been rapidly developing during the last few decades due to advancements and innovations in semiconductor devices, switching and modulation techniques, control methodologies, and of course computer modeling and analysis.

For the purpose of illustrating the concept of average-value modeling, this article considers DC-DC and DC-AC converters. For example, a key element of a basic pulse-width-modulation (PWM) DC-DC converter may be realized using a switched-inductor or switched-capacitor cell shown in Fig. 1 (a) and (b), respectively. Opening and closing the controllable switch (transistor) using PWM voltage or current control scheme enables energy conversion from one DC voltage level at the input source side to a different level at the output. A typical three phase inverter switching cell is depicted in Fig. 2. Here, the energy may be converted from a DC source to supply a load such an AC motor. This cell can also operate as a rectifier taking the energy from AC side (which may be an AC generator for example) and feeding the DC bus to supply other loads. In general, such machine-converter systems may provide bi-directional energy flow and are very common in motor-drives as well as generator-sets. A basic diode rectifier is obtained if transistors are removed from the circuit.

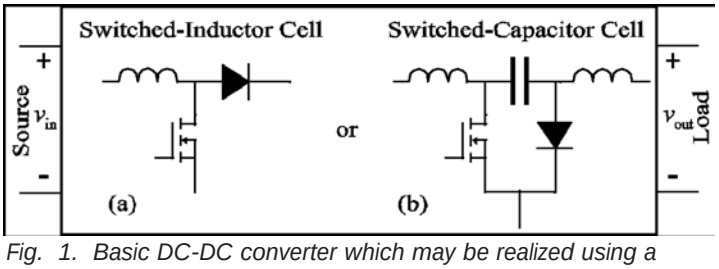

Fig. 1. Basic DC-DC converter which may be realized using a switched-inductor or a switched-capacitor cell.

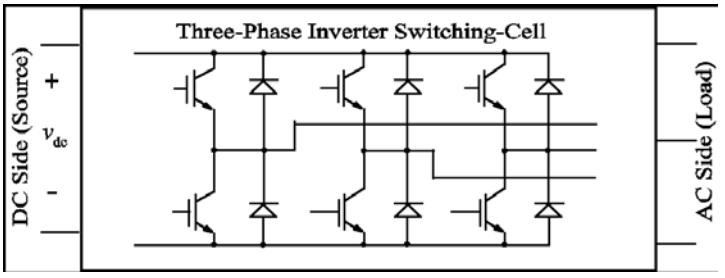

Fig. 2. Typical three-phase inverter switching cell.

Electric power systems of ships, aircraft, vehicles, etc., may be composed of numerous modules (power electronic building blocks [2]) that may include power electronic converters based on switching cells shown in Figs. 1 and 2. Typical modeling and design steps include:

Step 1: Defining converter topology and operation
Step 2: Detailed switching modeling
Step 3: Large- and/or small-signal average-value modeling
Step 4: Conducting studies/analysis, refining designs/controls

Once a particular converter topology has been considered in Step 1, the detailed modeling in Step 2 where the switching of each transistor and diode is represented may be readily carried out using a number of commercially available simulation packages [3]–[8]. However, for large- and small-signal analysis of motor-drives and power-electronic-based systems (PEBS) in Step 3, the so-called average-value models (AVMs), where the effect of fast switching is neglected or averaged with respect to a prototypical switching interval, are indispensable.

Analytical derivation of AVMs starts from Step 1 and typically involves some approximations (small and/or linear ripple, etc). This approach is very topology-specific and requires careful averaging of voltages and/or currents over a prototypical switching interval to obtain the corresponding average-value relationships for the state variables, which may be especially challenging in the presence of parasitics.

Fortunately, there is an easier way of constructing the desired AVMs at least for several types of PEBS. The approach featured in this article requires that the detailed switching model is constructed first (Steps 1 and 2, may have little or no analytical derivations). This detailed model is then used to run the simulations and calculate some specific parametric functions which are supplied to the dynamic AVM of a well-defined and easily obtainable form.

The dynamic AVMs typically execute much faster (by orders of magnitude) than the corresponding detailed models (Step 2), making them ideal for representing converters and motor-drive components in system-level transient studies in Step 4. Another important point is that dynamic AVMs are continuous and can therefore be linearized about a desired operating point. Thereafter, obtaining local transfer functions and/or frequency-domain characteristics becomes a straightforward and almost instantaneous procedure. Many simulation programs offer automatic linearization and frequency domain analysis tools [6], [7]. This opens an opportunity for computer-aided

construction of large- and small-signal AVMs with very minimal effort from the model developer. Some examples of PEBSs for which the AVMs have well-defined and easily obtainable form are described below.

II. DC-DC CONVERTERS

A somewhat exaggerated inductor current (state variable) for boost converter operating in discontinuous conduction mode (DCM) is shown in Fig. 3. The current segments in first and second subintervals are curved to indicate the effect of parasitic equivalent series resistances (ESRs) and diode/transistor forward voltage drop in the circuit. The switching subintervals are numbered $k = 1, 2, 3$, whereas the state variable and the duty interval in each subinterval are denoted by x_k and d_k, respectively. The overall switching interval is denoted by T_s. The continuous conduction mode (CCM) is achieved by removing the third subinterval ($d_3 = 0$) and letting $d_2 = 1 - d_1$ and $k = 1, 2$. The overall state $x(t)$ averaged over period T_s can be decomposed into contributions from each local subinterval as $\bar{x} = \bar{x}_1 + \bar{x}_2 + \bar{x}_3$. Classical state-space averaging assumes that $d_k \bar{x} = \bar{x}_k$, which is true only for CCM and piecewise linear waveform [9]. Otherwise, non-linear segments and/or interval when the state variable goes to zero (DCM) violate this condition.

To automate the generation of AVMs, it is first necessary to include the effect of parasitics. To achieve that, the conventional state-space averaged equation can be corrected using a special diagonal matrix $\mathbf{M}_\Delta$ as follows [10]:

$$\dot{\bar{\mathbf{x}}} = \left(\sum_{k=1}^{3} d_k \mathbf{A}_k \right) \mathbf{M}_\Delta \bar{\mathbf{x}} + \left(\sum_{k=1}^{3} d_k \mathbf{B}_k \right) \mathbf{u} \qquad (1)$$

Here, the matrices **A** and **B** must include all the necessary ESRs parasitics. This may be readily accomplished using a state-variable-based simulation package (e.g. [3]–[7], etc.) that has a circuit interface and can generate the state model and the matrices automatically. The state vector is typically composed of inductor currents and capacitor voltages, as $\mathbf{x} = [i_L, v_c, ...]^T$. For example, for the basic converters such as buck, boost, etc., with one inductor and one capacitor the number of state variables is 2. However, formulation (1) is very general and also works for higher order converters, e.g. switched-capacitor converters with two inductors and two capacitors (4 state variables) [11].

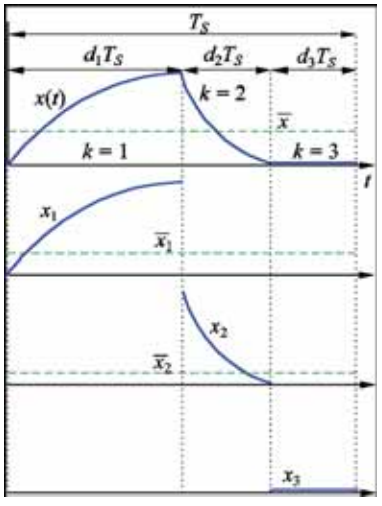

Fig. 3. Exaggerated inductor current waveform and switching subintervals for boost converter in DCM.

However, obtaining closed form analytical expressions for $\mathbf{M}_\Delta$ and d_k is difficult. Instead, one can use a detailed simulation to calculate these important parametric functions numerically without laborious analytical derivations. To do this, the detailed model is run in a loop spanning a desired range of operating conditions while recording the necessary variables. For example, Fig. 4 shows the correction coefficient m_1 corresponding to inductor current and the duty-ratio constraint d_2 calculated for a practical boost converter [9]. The shape of these functions changes significantly between the CCM and DCM, but more importantly these functions incorporate all the parasitics that were included in the original switching model.

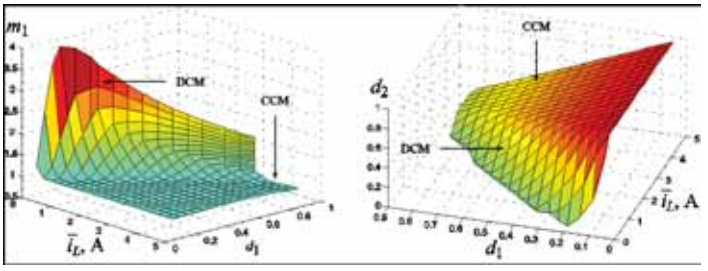

Fig. 4. Fast state variable correction coefficient and duty-ratio constrain for the example boost converter.

Provided that $\mathbf{M}_\Delta = diag[m_1, m_2, ...]$ and the duty intervals d_k are know, formulation (1) is valid regardless of the waveform non-linearity and continuity/discontinuity of individual state variables in **x**. In the transient study shown in Fig. 5 the converter initially operates in a steady state. Then, the duty cycle d_1 linearly increases from 0.3 to 0.95. The converter mode changes from DCM to CCM, and finally the overloaded operation is reached. The output voltage collapse at high values of the duty cycle is a phenomenon associated with the switching components' parasitics [12] and is well predicted by the developed AVM.

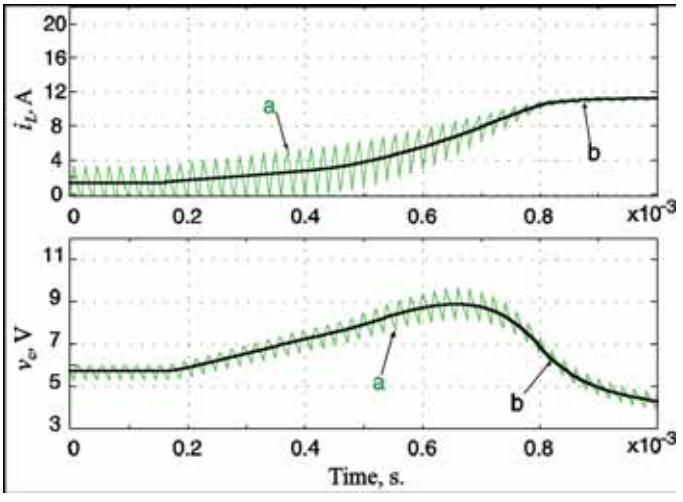

Fig. 5. Inductor current and capacitor voltage resulting from ramping-up the duty cycle: a – detailed simulation; b –numerically-constructed large-signal average-value model.

III. MACHINE-CONVERTER SYSTEMS

An interpreting example of motor-drive system for which the averaging has been a challenge is a brushless DC (BLDC) motor depict-

ed in Fig. 6 [13]. Such motors are typically driven by a Hall-sensor controlled 120-degree voltage source inverter. Simple in operation, these motors have good electromechanical characteristics, are inexpensive, and therefore widely used in many industrial and commercial applications.

For standard 120-degree operation, the switching of inverter transistors in the same phase-leg is not complementary. Typical phase voltage and current waveforms for this operation are depicted in Fig. 7, which shows that electrical cycle is divided into six 60-degree switching intervals denoted by T_s. Each phase is turned "on" for 120 degrees giving rise to two 60-degree intervals per electrical revolution when a phase is gated "off" [14].

As can be observed in Fig. 7, each switching interval T_s is now composed of two subintervals. For the purpose of illustration, the interval T_s starts when the phase b is being switched "off" [13]. In the beginning, the current i_{bs} is negative, then goes to zero and remains zero until the end of the interval. Here, the commutation time is denoted by t_{com}, whereas the conduction time is $t_{cond} = T_s - t_{com}$ during which the other two phases as and cs conduct the full current. Such switching patterns are referred to as operational modes. The commutation time t_{com} and commutation angle β depend on phase winding electrical time constant and operating conditions, but in general cannot be zero because the current in the inductor cannot be switched "off" instantaneously.

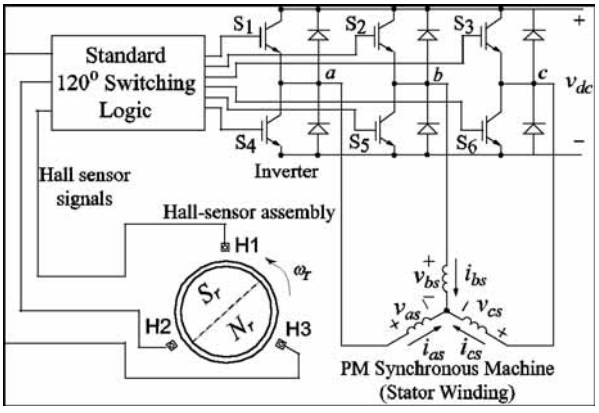

Fig. 6. Hall-sensor-controlled BLDC motor-inverter system.

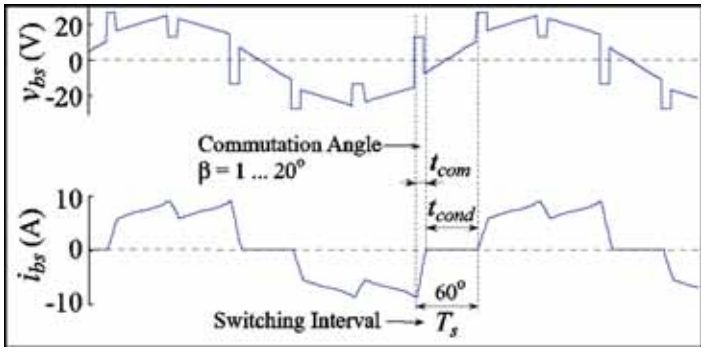

Fig. 7. Typical voltage and current waveforms for the BLDC motor.

To establish the AVM, the AC physical *abc* variables of the machine and converter are typically transformed using appropriate synchronous reference frame into *qd* variables that appear constant in steady state [15]. For calculating the correct averages it is important to include both commutation and conduction subintervals. For example, the total averaged stator voltages in rotor reference frame can be expressed as

$$\bar{v}^r_{qs}(\beta) = \bar{v}^r_{qs,com} + \bar{v}^r_{qs,cond} \tag{2}$$

$$\bar{v}^r_{ds}(\beta) = \bar{v}^r_{ds,com} + \bar{v}^r_{ds,cond} \tag{3}$$

which of course depends on β. The presence of operating-point- and parameter-dependant commutation angle β (and time interval t_{com}) is similar to DCM and makes it very difficult (if not impossible) to derive closed-form explicit analytical expressions needed for accurate AVM.

However, function $\beta(\cdot)$ can be established numerically using the featured computerized approach. Similar to the DC-DC converters, the detailed simulation can be used to compute β for a range of operating conditions. Here it is advantageous to express the commutation angle in terms of motor speed ω_r and dynamic impedance of the inverter switching cell defined as $z = v_{dc}/||\bar{i}^r_{qds}||$. For example, the angle $\beta(\omega_r, z)$ for a typical 210W BLDC motor is shown in Fig. 8 [16]. This angle changes quite significantly and is not negligible.

Once the function $\beta(\omega_r, z)$ has been established, the AVM is then constructed using the averaged stator voltages (2)-(3) and the *qd* model of PM Synchronous Machine [15]. The resulting AVM can be used right away. Fig. 9 shown the motor speed and torque during a start-up transient followed by a change in load. As can be seen, the constructed AVM predicts the transient very well.

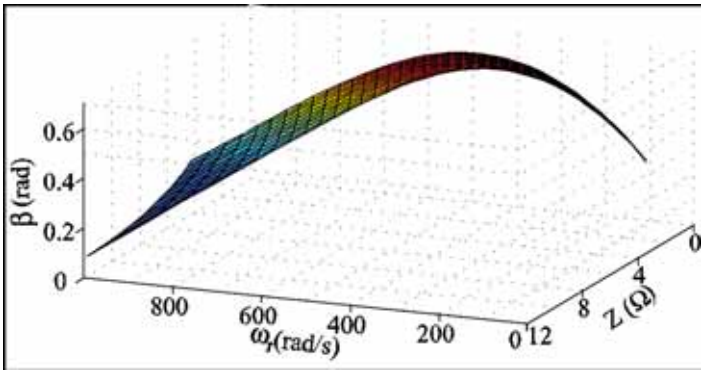

Fig. 8. Commutation angle for the example BLDC motor.

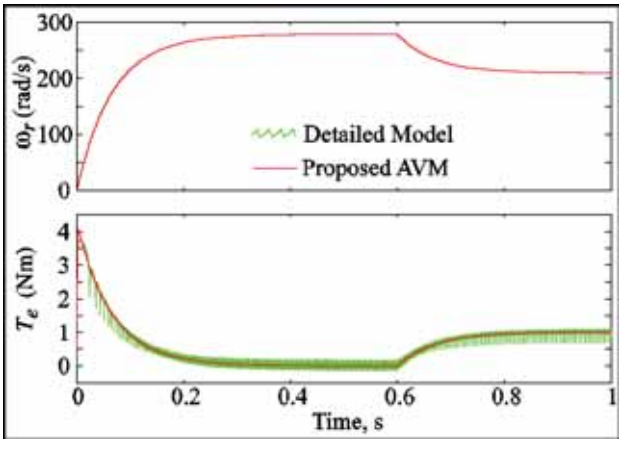

Fig. 9. BLDC motor start-up transient study.

IV. CONCLUSION AND FUTURE VISION

Traditional approaches for analytically deriving AVMs become very complicated for power electronic circuits and converters with para-

sitics and discontinuous mode. This article described an alterative and very effective approach for constructing AVMs for practical DC-DC converters as well as machine-converter systems. The methodology is based on using the detailed switching model and simulation to numerically calculate the required key parametric functions instead of laborious analytical derivations.

Some time ago engineers used to calculate eigenvalues and/or roots of polynomials for small- to moderate-size systems on a paper using analytical methods and procedures. Today, we use computers to solve similar problems for much larger and more complex systems in a fraction of a second. The goal is to develop approaches and methodologies that would completely automate generation of AVMs. This capability can then be put into various simulation packages and tools making the benefits of AVMs readily available to large number of engineers and researchers.

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ECE's Praveen Jain Receives $5.5 Million in Research Funding

By Tom Harper

January 18, 2008

Research at Queen's University to reduce the amount of electricity used by computers is one of 19 cutting-edge research projects supported by the McGuinty government, Minister of Research and Innovation John Wilkinson announced today.

Dr. Praveen Jain and his Energy and Power Electronics Applied Research Laboratory (ePEARL) project, "**Greenhouse Gas Emission Free and Energy Efficient Power Technology for Information Systems**", was awarded $5,539,084 by the Ontario Research Fund for developing green technologies to power information systems.

Matching funds from Queen's University and key private sector partners Cistel Technology Inc., Eion Wireless, IE Power, and Nortel Networks, brings the total project cost to $16,617,243.

Research being done by Dr. Jain and his team has the potential to create globally superior computer systems that are highly energy-efficient and environmentally friendly.

The goal of the project is to increase efficiency by 15 to 20 percent within the next five years and develop new commercially viable IT-specific renewable energy power systems, including wind and solar-based systems. In the process, researchers intend to reduce greenhouse gas emissions by millions of tonnes each year. Currently, information-processing centres (IPCs) consume large amounts of energy to run and maintain computer systems, servers and associated components. How much power is available and how it can be reliably and continuously supplied is of great interest to IPC owners and their engineers, suppliers, investors, and utilities.

The projects are part of the province's plan to help Ontario's top researchers develop new ideas and turn these ideas into products and services that can be marketed to the world.

Left to right: Kingston and the Islands MPP John Gerretsen, Dr. Kalai Kalaichelvan: President and CEO of EION Inc., Dr. Nishith Goel: President of Cistel Technology Inc., Dr. Praveen Jain: Queen's ECE, Dr. Alireza Bakhshai: Queen's ECE, Minister of Research and Innovation John Wilkinson, and Queen's University Principal and Vice-Chancellor Dr. Karen Hitchcock

Dr. Alireza Bakhshai, Dr. Kimberly A. Woodhouse: Dean - Faculty of Applied Science, Dr. Praveen Jain, Dr. Kerry Rowe: V.P. Office - Research

Government funding of $115 million for all 19 projects will be matched by 107 partners including industry.

"By investing in research and innovation and the skills and knowledge of our people today, we will ensure Ontario remains the best place in the world to live, work, and raise a family," Wilkinson said. "Ontarians will benefit from better health-care services, new technologies, a cleaner environment, and more opportunities for success."

"Ontario communities have some of the best research talent in the world working in state-of-the-art facilities," said John Gerretsen, MPP for Kingston and the Islands. "I am pleased that we're helping to attract and retain leading scientists at Queen's University, creating a stronger community and more prosperity in Kingston and eastern Ontario."

The Ontario government is investing $527 million over five years through the Ontario Research Fund to support leading-edge research and development in Ontario's universities, institutes and hospitals, and to leverage support from the federal government and private industry.

The fund is a key part of the province's plan to support scientific excellence that can be developed into innovative goods and services that will boost Ontario's economy.

For more information about the Ontario Research Fund, please visit http://www.ontario.ca/innovation.

CPES Living Lab for Future Energy Sustainable Home - featured in July issue of Virginia Business Magazine

To raise public awareness about renewable energy, CPES at Virginia Tech is modifying a research lab to incorporate emerging and anticipated future home/small office renewable energy technologies and power management systems. This project, which is focused on researching, developing and demonstrating advanced technologies that would create self-sustained homes, is featured in the July issue of Virginia Business magazine.

(Full article: http://www.virginiabusiness.com/index.php/news/article/virginia-tech-project-designing-sustainable-home-of-the-future/1079/)

Four rooms in CPES are being converted into a "living lab." This 1,500 sq. ft. space includes a kitchen, utility room, library/lounge and conference room where students, faculty and staff can use for normal daily functions. The lab is outfitted with next-generation home appliances, high-efficiency light-emitting diode (LED) lamps and home robotics. Everything is powered by multiple renewable energy sources, including the wind turbines and solar panels currently installed at Virginia Tech.

Courtesy of Virginia Tech Center for Power Electronic Systems
Teresa Shaw

The home also relies on plug-in hybrid electric vehicles for use as backup generators or for energy storage. Candidate appliances include a washer, dryer, microwave oven, range, dishwasher, refrigerator, air conditioners, television, and audio system. With all these features in place, the home/small office could then act as both a supplier of energy to the local power company and as a user.

Implementation of home automation technology will manage power generation, conversion and usage. Wireless control and monitoring will manage power consumption of lighting, home electronics, appliances, and other loads. The goal is to test the efficiency and efficacy of the various technologies and power sources, hoping to demonstrate that we could help minimize utility power to a point where the home could be self-sustaining.

The solar array is mounted on the roof of Whittemore Hall. CPES installed 30 Suntech STP170S-24/Ab-1, monocrystalline, solar panels in three arrays of 10 panels each. These panels are rated at 35.2 VDC @ 4.83 amps and 170 watts power @ 14.1% efficiency. The panels are roughly 62 inches by 32 inches in size and are mounted on a fixed Unirac mounting rail system. All three solar arrays are connected to a Xantrex inverter which converts the power from DC to 240 VAC. Since the solar arrays are fixed position and therefore do not track the sun's position, the maximum solar array power output is 5,100 watts on a cloud free day when the sun is at its peak. This value will change based on the sun's position throughout the day and throughout the year.

Book Review

Modern Heuristic Optimization Techniques Theory and Applications to Power Systems

By KWANG Y. LEE & MOHAMED A. EL-SHARKAWI

John Wiley Publishers, 2008, pages 586

This is an edited text based on the contributions of thirty five co-authors under the direction of the main authors. The nineteen chapters of Modern Heuristic Optimization Techniques, most with multiple authors, form a cohesive treatment of cutting-edge methods applied to computational intelligence systems. In fact, this systems engineering approach is very applicable to tackling difficult real world engineering and business world problems. The authors link the optimization techniques to power systems and give practical examples to highlight the topics being covered.

PART I THEORY OF MODERN HEURISTIC OPTIMIZATION

PART II SELECTED APPLICATIONS OF MODERN HEURISTIC OPTIMIZATION IN POWER SYSTEMS

To highlight the value of this text some salient features are excerpted from the various heuristic techniques. "Natural evolution is a hypothetical population-based optimization process. Simulating this process on a computer results in stochastic optimization techniques that can often outperform classic methods of optimization when applied to difficult real-world problems." Coverage proceeds next with genetic algorithms (GA), Evolution Strategies, Evolutionary Programming (EP) and Differential Evolution. "Evolutionary programming is a stochastic optimization strategy similar to a GA that places emphasis on the behavioral linkage between parents and their off-spring." Following these techniques are three new methodologies inspired by observations of the natural world: Particle Swarm, Ant Colony Search and Tabu Search. Particle swarm is similar to GA, "however, each potential solution (called a particle) is also assigned a randomized velocity and then flown through the problem hyperspace." A fascinating approach based on the behaviors of real world ants in finding the shortest paths and adapting to a changing environment. "Studies by ethnologists reveal (these) such capabilities are essentially due to what is called "pheromone trails," which ants use to communicate information among individuals regarding path and to decide where to go." "Tabu search (TS) is basically a gradient-descent search with memory." The final two heuristic optimization methods are more familiar to engineers and include Simulated Annealing and Pareto Multiobjective Optimization. "In statistical mechanics, a physical process called annealing is often performed in order to relax the system to a state with minimum free energy….The name simulated annealing originates from the analogy with the physical process of solids, and the analogy between physical system and simulated annealing is that the cost function and the solution (configuration) in the optimization process correspond with the energy function and the state of the statistical physics, respectively." And lastly, Pareto Multiobjective Optimization. "Compared with single-objective (SO) optimization problems, which have a unique solution, the solution of multiobjective (MO) problems consists of sets of trade-offs between objectives. The goal of multiobjective optimization (MOO) algorithms is to generate these trade-offs."

In this reviewers experience the sizing of utility level dynamic voltage restorers that rely on power electronic converters and ultracapacitor energy storage are becoming more common. Also, the techniques of active power filtering and most recently, transformerless hybrid active filter (H. Akagi, 7th International Conference on Power Electronics, 2007) as the front end in medium voltage motor drives needed to minimize harmonic pollution of the utility rely on power electronic conversion and capacitive energy storage. Modern Heuristic Optimization Techniques makes an excellent contribution by noting that "The reactive power or VAR planning problem at the generation-transmission level is a nonlinear optimization problem. Its main object is to find the most economic investment plan for new reactive sources at selected load buses that will guarantee proper voltage profile and the satisfaction of operational constraints." As the authors say, there is growing concern in power systems about reactive power operation and planning so that very sophisticated tools are being employed including simulated annealing and GA.

This text provides excellent, expert level, treatment of a very important systems engineering topic that will benefit students and practicing engineers.

Bio: John M. Miller, Ph.D.
Vice President, Systems Applications Integration

John Miller joined Maxwell in December 2005, assuming primary responsibility for world wide applications engineering that includes development of Maxwell University training for field application engineers. He remains active in the development and promotion of ultracapacitor-based solutions for the automotive and heavy vehicle industries. Previously, he spent 18 years in a series of engineering and research and development positions with the Ford Motor Company, where he led several Ford automotive electronics and electric and hybrid drive train development programs before taking early retirement in 2002. Immediately prior to joining Maxwell, he spent three years as an industry consultant, author and guest lecturer. He holds 52 patents and has written more than 140 scientific and technical papers and three books, including Hybrid Vehicle Propulsion Systems, which was published in 2003. He holds a BS degree from the University of Arkansas, an MS degree from Southern Methodist University and a doctorate from Michigan State University, all in electrical engineering.

Argonne NATIONAL LABORATORY

PSAT V6.2 SP1 Released

PSAT is recognized as a state-of-the-art, innovative simulation tool.

PSAT received an FLC Award in 2007 and an R&D 100 Award in 2004, as one of the 100 best products and technologies newly available for commercial use from around the world.

Sixteen universities are using PSAT to select their powertrains and develop control strategies as part of the EcoCAR competition, a student engineering vehicle competition organized by General Motors and DOE.

Argonne National Laboratory is using PSAT to lead DOE's effort to evaluate Plug-in Hybrid Electric Vehicles (PHEVs) and PHEV technology.

In addition to PSAT, Argonne's PHEV capabilities include battery testing and development, vehicle testing, technology viability assessment, the Mobile Advanced Technology Testbed, and advanced vehicle testing.

PSAT is the U.S. Department of Energy's FreedomCAR and Fuels Partnership Program's primary vehicle simulation tool.

More than 400 researchers worldwide at over 100 companies and universities use Argonne National Laboratory's Powertrain Systems Analysis Toolkit (PSAT), employing its capabilities for vehicle systems analysis, control strategy development, hardware-in- the-loop, and technology validation. PSAT, a forward-looking model, is the U.S. Department of Energy's FreedomCAR and Fuels Partnership Program's primary vehicle simulation tool. The U.S. government has used PSAT to help guide future federally funded research activities.

PSAT has been updated and enhanced to incorporate changes suggested by current industry, university and national laboratory users. PSAT V6.2 SP1, which runs with Matlab R2007b, incorporates many features and improvements, including:

- Additional component data, including GM 1.9L diesel from ANL's dynamometer testing and Camry electric machine from OakRidge National Laboratory
- Additional drive cycles for both light and heavy duty vehicles, including JC08, HHDDT65, CSHVR…
- Additional HEV vehicles, including the Escape and the Camry (both correlated using ANL's chassis dynamometer test data)
- New initialization files and vehicles for PHEV
- Enhanced battery model allowing usage of cells in series and parallel
- Additional modifications based on users feedback (i.e, GUI, configurations, post-processing, models…)

Development of PSAT began with the United States Council on Automotive Research partners in 1995 in response to the need for a common advanced powertrain modeling software that could realistically simulate fuel economy and performance.

The continuing development and maintenance of PSAT is funded by the DOE's Office of Vehicle Technologies and managed by Lee Slezak

For more information:

PSAT website
PSAT technical questions – Aymeric Rousseau, PSAT Team Lead
PSAT licensing information – Paul Betten, Argonne's Technology Transfer Account Manager
Other HEV or PHEV activities – Don Hillebrand, Director, Argonne's Center for Transportation Research

Co-Sponsored by:
IEEE Vehicular Technology Society (VTS)
IEEE Power Electronics Society (PELS)

Call for Papers

The IEEE Vehicle Power and Propulsion Conference 2008 (VPPC 2008) aims to provide a forum for sharing knowledge, experience and creative ideas in vehicle power and propulsion. The conference will be held in Harbin, China from **September 3 to 5, 2008**. The conference will include keynote papers by authoritative speakers, technical sessions, tutorial session, poster sessions, special and invited sessions, product display, welcome reception, banquet and culture evening. The conference will focus on current issues in the area of vehicular power systems, propulsion, power electronics, and motor drives, etc. It is a great pleasure to invite you to submit papers of the following and related topics. English is the official language and will be adopted in all the publications and presentations.

Track 1: Vehicular Electric Power Systems and Loads

- Power System Architectures
- Power Management and Distribution
- Harmonics and Power Quality
- Vehicular Power Systems and Loads
- Military vehicular power systems and loads
- Active Suspension
- Advanced/Conventional Vehicle Electrical Loads
- 42V PowerNet
- Higher Voltage Power Systems
- X-By-Wire
- Electric Power Steering
- Motion Control

Track 2: Vehicular Power Electronics and Motor Drives

- Automotive Power Electronic Systems
- Electrical Machines and Drives
- Applications in Land, Air, Space, Sea and Undersea Vehicles
- Starters, Generators, Integrated Starter/Alternators
- Drive Trains
- EMI/EMC

Track 3: Advanced Vehicles

- Advanced Land, Sea, Air and Space Vehicles
- Electric and Hybrid Electric Vehicles
- Plug-in Hybrid Electric Vehicles
- Fuel Cell Vehicles
- Military, Multi-wheeled Vehicles, Heavy-duty, Off-road and Rail Vehicles
- New Energy Vehicles

Track 4: Energy Storage Components/Systems

- Battery Technology & Management Systems
- Hybrid Energy Storage Systems
- Charge/Discharge Units & Technology
- Hydrogen Fueling for Vehicle Applications
- Fuel Cells and Automotive Applications
- New Capacitor and Ultra-capacitor Technology

Track 5: Vehicular Electronics

- Automatic Cruise Controls
- Remote Sensing and Fault Tolerance
- Engine Controls
- Wireless Sensors and Controls

Track 6: Modeling, Analysis, Dynamics, and Control

- Modeling, Simulation, Analysis, Design, Dynamics and Control
- CAD/CAE
- On-board Power Management
- Educational Approaches
- Tank-to-Wheel Analysis
- Hybrid Control Strategies
- Thermal Analysis and Management
- Optimal Analysis and Load Control
- Well-to-Wheel Analysis
- Packaging

Harbin.China
www.vppc2008.com

Harbin Institute of Technology

2008 IEEE Vehicle Power and Propulsion Conference (VPPC2008)

Following the success at Chicago, Illinois, USA (2005), Windsor, England, United Kingdom (2006), and Arlington, Texas, USA (2007), the 2008 IEEE Vehicle Power and Propulsion Conference (VPPC2008) will be held at Shangri-La Hotel in Harbin, China, September 3-5, 2008, the first time in an Asian country. The VPPC is sponsored by IEEE Power Electronics Society and Vehicular Technology Society..

VPPC2008 aims to provide a forum for sharing knowledge, experience and creative ideas in vehicle power and propulsion. The theme of the conference is: "Powering Sustainable Mobility". The challenges of sustainable mobility are energy, environment and safety. Power and Propulsion are the key technologies for clean, efficient and intelligent vehicles towards sustainable mobility. The conference will focus on current issues and future trends in the area of vehicular power systems, propulsion, power electronics, motor drives, etc. It will include authoritative keynote speeches, informative tutorials, inspiring special sessions, regular technical sessions and international workshop which make the event an excellent opportunity to meet our goals. In addition to technical program, there is also culture and social program, including welcome reception, banquet, technical tour, culture evening and sightseeing tours.

VPPC2008 has organised eight keynote speeches:

Keynote Speech 1: "Issues and Opportunities in Sustainable Fuel and Vehicle Technologies", by ***Professor M. Ehsani***, Director, Advanced Vehicle Systems Research Program, Texas A&M University, USA.

Keynote Speech 2: "Plug-in Hybrid Electric Vehicles: Sustainable Solution for Transportation", by ***Professor Ali Emadi***, Founder and President, Hybrid Electric Vehicle Technologies, Inc., Illinois Institute of Technology, USA.

Keynote Speech 3: "High Temperature Electronics Design Considerations for Electric and Hybrid Electric Vehicles", by ***Professor Jih-Sheng (Jason) Lai***, Director, Future Energy Electronics Center, Virginia Polytechnic Institute and State University, USA.

Keynote Speech 4: "Trends in Vehicle Energy Storage Systems: Batteries and Ultracapacitors to Unite", by ***Dr John M. Miller***, Vice President, Systems Applications Integration, USA.

Keynote Speech 5: "Power Electronics- An Enabling Technology for Reducing CO2 with Demand Driven Electric Power Control", by ***Professor Leo Lorenz***, Senior Director, Infineon Technologies China Co. Ltd.

Keynote Speech 6: "Automotive Energy and Powertrain Development in China", by ***Professor Ouyang Minggao***, Director, National Laboratory of Automotive Safety and Energy, Tsinghua University, China.

Keynote Speech 7: "Electrical Machine Topologies and Technologies for Electric, Hybrid, and Fuel Cell Vehicles", by ***Professor Z.Q. Zhu***, University of Sheffield, UK, and ***Professor C.C. Chan***, Co-founder and President Elect , World Electric Vehicle Association, President, Asian Electric Vehicle Society.

Keynote Speech 8: "Chassis control systems: state of the art review", by ***Professor David Crolla***, Head, School of Mechanical Engineering, University of Leeds, UK, and ***Professor Fan Yu***, Institute of Automotive Engineering, , Shanghai Jiao Tong University, Shanghai, China.

Two half-day pre-conference tutorials:

Tutorial 1: "Overall Efficiency Analysis of Future Vehicular Drive Trains from a Well-to-Wheels Perspective", by ***Prof. Sheldon S. Williamson***, Concordia University, Canada

Tutorial 2: "Planetary Gear Based Hybrid Electric Vehicle, Power-Split HEV Powertrain, and e-CVT", by ***Professor Chris Mi***, University of Michigan – Dearborn, USA

Six technical tracks:

Track 1: Vehicular Electric Power Systems and Loads:
Track 2: Vehicular Power Electronics and Motor
Track 3: Advanced Vehicles:
Track 4: Energy Storage Components/Systems:
Track 5: Vehicular Electronics:
Track 6: Modeling, Analysis, Dynamics, and Control:

There will be a following up International Workshop on **"Modelling and control using Energetic Macroscopic Representation Application to hybrid electric vehicles and others",** to be held from September 6 to 7, 2008.

Approximately 400 papers have been accepted from over 550 submissions. The IEEE VPPC 2008 will be truly a successful gathering of engineers, scientists, officers and industrialists to advance our knowledge and foster our friendship and collaboration.

Professor C. C. CHAN, *General Chairman*
Professor Dian-guo XU, *Technical Program Chairman*
Prof. Chunbo ZHU, *Secretary General*
School of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin, China
Tel(86)-0451 86413621-20; Mobile (86) 13503602980
Conference website: www.vppc2008.com

Picture Source: Wikimedia Commons; Left: Wind turbines near Aalborg, Denmark by Neutronic; Right: Photovoltaic array near Freiberg (Germany) by Eclipse.sx

Call for Papers

IEEE International Conference on Sustainable Energy Technologies

24 – 27 NOVEMBER 2008, SINGAPORE

Organised by: IA/PELS Joint Chapter, IEEE Singapore Section
Sponsored by: IEEE Power Electronics Society, Industry Applications Society
Industrial Electronics Society and Power Engineering Society

The world is concerned with depletion and rising cost of non-renewable energy resources, energy security, its access, and environmental impacts of energy usage. At the same time, with distributed and clean energy resources becoming widespread and significant research works being conducted in this field, it is timely to launch the inaugural IEEE International Conference on Sustainable Energy Technologies in 2008.

This is the first of a regular series of international biennial conferences being planned to bring together professionals and executives in the energy sector, electrical power companies, manufacturing industries, research institutes and educational bodies to share and exchange ideas and information pertaining to sustainable energy technologies.

Authors are invited to submit the manuscript containing an abstract (first page) and an extended summary of no more than 5 pages in any of the areas identified below. Please submit your paper at the conference website: www.icset2008.org

The Proceedings of the conference will be included in the IEEEXplore digital library and indexed by EI. Approximately 20% of the conference papers will be selected to be considered for the publication in the IEEE Transactions on Industry Applications.

Original contributions are now sought in the following areas, including but not limited to:

- New Devices and Circuits for Energy Systems
- Photovoltaics and Solar Thermal
- Wind Energy Systems
- Fuel Cells Systems
- Bio-energy and Geo-energy
- Other Sustainable Energy Resources and System
- Energy Storage Systems
- Energy Market, Management and Economics
- Off-grid Isolated Energy Systems
- Energy in Transportation Systems
- Energy Resources for Portable Electronics
- Intelligent Energy, Power Transmission Distribution, Interconnects and Protection
- Energy Efficiency in Utilization
- Environmental Issues
- Energy Harvesting
- Nanotechnology in Energy
- Policy Issues on Renewable Energy
- Building Design and System
- Power Electronics and Energy Conversion
- New Materials for Energy Resources
- RF and Magnetic Field Energy Devices

More details please view the official conference website: www.icset2008.org

Important Dates

Submission of Papers:	15th July 2008
Notification of Acceptance:	15th August 2008
Submission of Final Paper:	15th September 2008

ICSET 2008 Conference Manager: c/o Integrated Meetings Specialist Pte Ltd Blk 998 Toa Payoh North #07-18/19 Singapore 318993
Email: icset@inmeet.com.sg Tel: (65) 6356 4727 Fax: (65) 6356 7471

Meetings of Interest

11th IEEE Workshop on Control and Modeling for Power Electronics: COMPEL2008, to be held 18-20 August 2008 at ETH Zurich, Zurich, Switzerland. Digest submission deadline is 14 April 2008. For more information visit the conference website: http://www.pes.ee.ethz.ch/compel2008

INTELEC® 2008, 30th Anniversary Meeting, will be held 14-18 Sept. 2008 at the Town and Country Resort and Convention Center in Mission Valley, San Diego, CA. For more information please contact intelec@pcmisandiego.com for information.

43rd Industry Applications Society annual meeting is announced for 5-9 October 2008 at the Weston, Edmonton, Alberta, Canada. Author's deadlines are abstract and digest by 15 Jan 2008 followed by notice of acceptance by 31 March 2008. For more information on the conference and technical program visit the website at: http://www.ieee.org/ias2008

5th Vehicle Power and Propulsion (VPPC2008) Conference is announced for 3-5 September 2008 in Harbin, China. Correspondence may be directed to: vppc2008@hit.edu.cn. VPP'08 general chair: Prof. C.C. Chan, Harbin Institute of Technology. Abstracts with contact details should be submitted by 1 March 2008. VPP'08 is co-sponsored by PEL's. For more information visit the website at: www.vppc2008.com

24th Annual IEEE Applied Power Electronics Conference and Exposition, APEC'09, will be held 15-19 Feb. 2009 at the Marriott Wardman Park Hotel, Washington, D.C. For further details please visit www.apec-conf.org

European Power Electronics, EPE2009, is planned for 8-10 September 2009 in Barcelona, Spain. Call for papers to be released in May 2008 with deadline for receipt of synopses Nov. 2008. For more information visit: http://www.epe2009.com

1st Annual Energy Conversion Congress and Exposition (ECCE2009) is announced for 20-24 September 2009 at the Double Tree Hotel at 2050 Gateway Place in San Jose, CA. For more information on ECCE2009 visit the conference website: www.ecce2009.org

44th Industry Applications Society annual meeting is announced for 4-9 October 2009 in Houston, Texas. This will be a new meeting format following the transition of IAS committees to ECCE2009 with more emphasis on tutorials and workshops. For more information visit the website at: www.ieee.org/ias2009

International Conference on Power Electronics CIEP'08

Cuernavaca, Mexico, August 24-27,2008

Organizers:

CENIDET (National Center for Research and Technological Development)
IEEE Section Morelos - PELS Chapter
SOMEP (Mexican Society of Power Electronics)

Technical co-sponsor:

IEEE Power Electronics Society

Dear colleagues,
On behalf of CENIDET (National Center for Research and Technological Development), IEEE Section Morelos - PELS Chapter, SOMEP (Mexican Society of Power Electronics and CIEP'08 Organizing Committee, It is a great pleasure for me to welcome you to the 11th International Conference on Power Electronics - CIEP'08, which will take place in the beautiful city of Cuernavaca (worldwide known as the "City of the Flowers" or the "Ever spring city", located in the state of Morelos, MEXICO.

We are sure that the conference will provide you the opportunity to be in contact with the latest advances in Power Electronics and networking your research with other colleagues, through an interesting technical program which includes technical sessions, tutorials, rap sessions and distinguished lectures.

Caring for the importance of promoting Power Electronics technology with engineering students, an important event of the conference will be a Special Session in which undergraduate power electronics projects will be presented. CENIDET, SOMEP and the IEEE Section Morelos-PELS Chapter will recognize the best projects.

I would like to encourage the power electronics community, to present the results of their works in the conference topics, which covers Motion Drives and Motion Control, Simulation Modeling and Analysis, DC to DC converters, Industrial Electronics, Electronic Ballast, Test and Measurement in PE, Computer Applications in PE, Control Theory Applied to PE, Power Semiconductor Devices, Power Factor Correction, Active Filters, Thermal Problems and other related topics.

Please make sure to regularly check our website for updates and do not hesitate to contact me for any questions you might have. I am looking forward to seeing you in Cuernavaca.

Warmest Regards
Jaime Arau
CIEP'08 General Chairman
Interior Internado Palmira s/n, Col. Palmira. Cuernavaca, Morelos, México.
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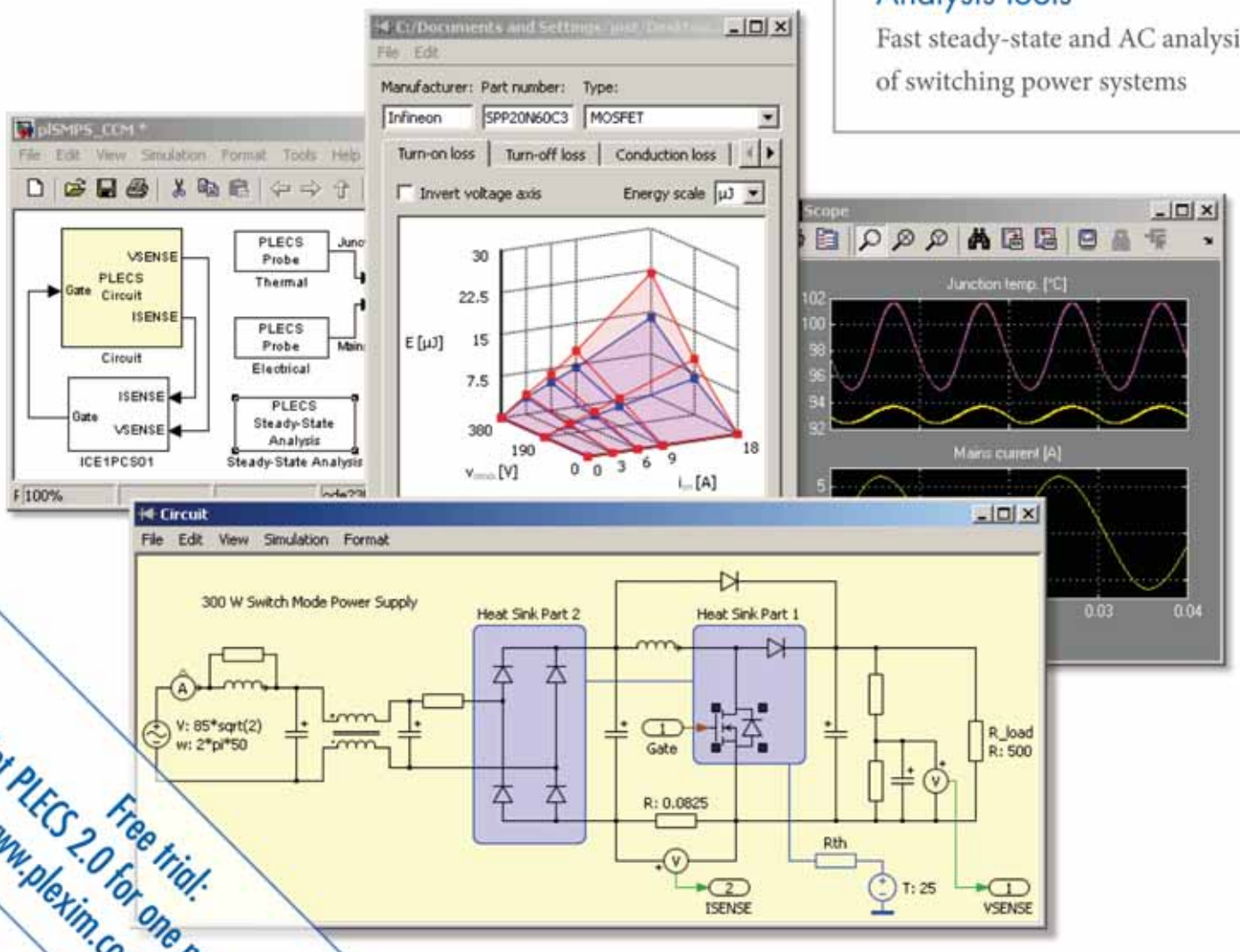

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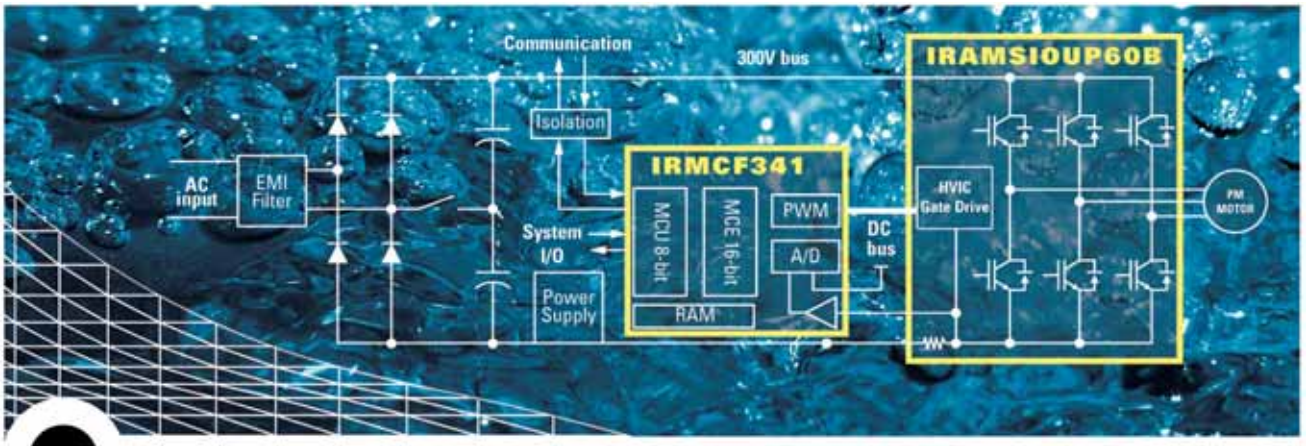

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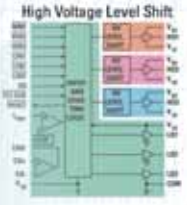

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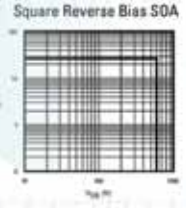

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