



## President's Message

A primary goal of the IEEE is to globally share knowledge about electrical and information technologies and sciences. This clearly is also a primary interest of PELS, and an important reason to become a member. PELS is a leader in publishing the latest results and technical developments within its scope. But meeting the goal to share knowledge goes far beyond just disseminating research results. It must also include continuing, life-long education for our members. This is particularly important to practicing engineers. PELS is committed to expanding and enhancing continuing ed opportunities such as the distinguished lecturer program, available to all chapters, and through tutorials and seminars. Our conference tutorials have always provided an excellent selection of current and interesting educational topics. APEC provides as impressive an array of "professional seminars," as any conference I know. PESC and INTELEC also offer an excellent selection of tutorials on timely subjects at each conference. I want to encourage our chapters to develop their own tutorials catering to local members. Not only is this an excellent service to members, but proceeds can be used for other important chapter functions.

Attendance at tutorials, however, is often not possible for many members, especially those who are only peripherally interested in a general area. I would like to see more papers of a tutorial nature submitted and accepted in our conferences. This would serve two purposes. First, there seems to be a consistent desire among conference attendees to have more papers of a "practical, applied, or industrial" nature. Tutorial papers most often fit this bill, and will make our conference paper sessions even more attractive. Furthermore, tutorial papers allow people recently interested in a topic to get up to speed in areas too new to be included in other texts. Secondly, IEEE conference proceedings and papers are often the easiest and lowest cost publications which all members can access from libraries or purchase.

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## INTELEC® 2001 Coming to Scotland in October

The 23<sup>rd</sup> International Telecommunications Energy Conference (INTELEC) will be held 14-18 October 2001, in Edinburgh, Scotland, UK. Over 120 technical papers and workshops will cover telecomm power and cooling issues including DC power systems, UPS systems, batteries, distribution power and AC power systems. Powering and cooling issues will include telephony, cable, mobile and office. The conference theme for 2001 is "No Power, No Service, No Revenue."

INTELEC has increasingly attracted middle to senior managers from all over the world and now represents an unparalleled opportunity to meet and discuss power and cooling trend developments with other leading players and service providers. The event will be chaired by John Parsons, BT. The IEEE Power Electronics Society (see <http://>

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## APEC® 2001 Sets New Attendance Records

APEC 2001, the most comprehensive conference addressing "applied" power electronics, was held March 4-8 at the Disneyland Hotel in Anaheim CA. Attendees had the opportunity to attend 15 professional education seminars, 31 multi-speaker technical sessions, 12 vendor application seminars, three RAP Sessions, the Exhibit Hall, the 15th annual Micro Mouse competition, and our Wednesday evening banquet held in the Disneyland Theme Park. The true test of the strength of any conference is attendee support during an economic downturn.

With the NASDAQ falling 60% from its record high of one year ago, travel restrictions were imposed on some of our Fortune 100 companies. Yet in spite of disappointing Wall Street results, predicted heavy rain, and temporary shutdown of major northeast airports due to a snowstorm, APEC 2001 set new records for technical session attendance (736), total attendance (2275) and exhibitor participation (820)!



*Continued on page 3*

## Plans Finalize for PESC® 2001 in Vancouver

June 17 – 21 is approaching rapidly and we are eagerly looking forward to welcoming you to Vancouver then for PESC 2001. Conference registration and accommodation reservations are available on the PESC 2001 website at [www.conferences.ubc.ca/pesc2001](http://www.conferences.ubc.ca/pesc2001). You will be able to access the Internet and your e-mail provider at no cost from computers in the Woodward IRC Building. Full details will be available in your on-site registration package. For the best selection of accommodation on the University of British Columbia campus, we urge you to make your reservation soon.

Approximately 600 digests were submitted for PESC 2001. That maintains the record-breaking submission level established last year in Ireland, and it both indicates consistently high interest in PESC and provides high-quality technical content. PESC obviously generates substantial interest in both Europe and North America. About 375 (62 %) of the digests have been accepted for presentation, and as a new departure for PESC, 150 of these will be presented as posters in the ex-

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## Quicker News Delivery

The *Power Electronics Society Newsletter* is available on the internet in electronic PDF format much sooner than hardcopies can be printed, labeled, and delivered by postal mail. To receive email notification when the newsletter is posted on the PELS server, go to <http://www.pels.org/Mailing/MailForm.html> and add your name to the notification service list.

## Book Reviews

This issue has no book review because none were submitted. Please send the editor a short prioritized list of outstanding technical books that you would be willing to review and share with your colleagues.

### IEEE Power Electronics Society Officers

**Thomas Habetler, President**  
**Dean Patterson, V. P., Operations**  
**F. Dong Tan, V. P., Meetings**  
**Steven B. Leeb, Treasurer**  
<http://www.pels.org>

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News items should be sent to: Gene Wester, Editor, *PELS Newsletter*, Jet Propulsion Laboratory, M/S 303-300, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, USA; TEL: +1 818 354 3489; FAX: +1 818 393 4272; EMAIL: [gwester@jpl.nasa.gov](mailto:gwester@jpl.nasa.gov). Deadlines for copy are March 15, June 15, September 15 and December 15. Submission of items by email in plain-text format is preferred. Plain-text (straight ASCII) submissions on 3.5" diskettes are welcome, and should be accompanied by a backup printout. Fax submissions are acceptable, but are least desirable. Full-page calls for papers and announcements of PELS-sponsored conferences are welcome and should be sent as both high-quality hard copy and RTF format file.

The editor gratefully acknowledges the Jet Propulsion Laboratory for significant support of his editorial activities.

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## Call for PESC® 2006 and 2007 Site Proposals

The location of PESC 2006 will be decided at PESC 2001 in Vancouver. In keeping with tradition, the 2006 conference would be held normally at a location in the Far East/Australia (IEEE Region 10), and the 2007 conference would be held normally in North America/South America (Regions 1-7 or 9).

A proposal outline for 2006 should be submitted to the PESC Steering Committee via the PELS coordinator Bob Myers <[bob.myers@ieee.org](mailto:bob.myers@ieee.org)> by May 31, 2001. The proposal should include: local conference facilities, name of proposed General Chair, and outline of budget. Each proposer for 2006 should plan to attend the PESC Steering Committee in Vancouver on Sunday June 17, 2001 and make a short presentation.

We are also interested in preliminary proposals for 2007. Further information may be obtained from the undersigned.

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## INTELEC 2001

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[www.pels.org](http://www.pels.org)) is a Technical Co-sponsor of INTELEC 2001.

INTELEC 2001 will be held at the Edinburgh International Conference Centre (EICC), an award winning conference venue, located in the heart of Edinburgh. The large exhibition will be held in the purpose-built air-conditioned exhibition hall of the Centre which offers easy access for exhibitors.

Edinburgh, the capital of Scotland, is world famous for its castle and arts festival and has recently been awarded World Heritage Status. Scotland's attractions include the spectacular scenery, famous golf courses, Baronial Halls, whisky distilleries and tartan weaving. The conference centre itself is located within walking distance of a wide range of hotels, Princes Street with its superb shops, the ancient Castle and the Royal Mile in the Mediaeval old town.

Edinburgh International Airport is less than 20 minutes from the city centre and provides superb access to a worldwide network of flights. Rapid rail services to London and other UK cities, plus an excellent

## European Liaison

Effective January 1, Rik W. De Doncker became the European Liaison for PELS. The European Liaison serves as the interface between PELS and the European power electronics societies (mainly ESPC, EPE), universities, industry and potential authors for Society conferences. As member of the



EPE Executive Council, VDE and Past Chairman of the German Joint IAS-PELS Chapter, R. De Doncker is in an excellent position to explore stronger international cooperations between PELS, with its IEEE sister societies (i.e. IAS, IES and PES), and European associations and societies. It is anticipated that cooperations will ultimately lead to improved quality of our products, e.g. conferences. Motivation is guaranteed, as R. De Doncker will organize our very own PESC conference in the year 2004 in Aachen, Germany!

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motorway system, provide easy access for travelers from any destination.

Each year more companions attend INTELEC. Companions and delegates will be offered a stimulating programme of visits including trips to the Borders, Royal Yacht Britannia, a whisky distillery, some castles, and the Kingdom of Fife.

Early indicators suggest that the conference will be a resounding success. Over 250 abstracts have been received, and all of the exhibition area has been sold. The ten main corporate sponsorships are all taken, although there are still some other sponsorship opportunities. The provisional programme will be available in July. To receive a copy, please register your interest with the INTELEC Secretariat below.

**INTELEC Secretariat**  
 IEE Conference and Exhibition Services  
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 London UK, WC2R 0BL  
 Tel: + 44 (0)20 7344 5472  
 Fax: +44 (0)20 7240 8830  
 Email: [intelec@iee.org.uk](mailto:intelec@iee.org.uk)  
<http://conferences.iee.org/INTELEC2001/>

## Automotive Power Electronics Workshop Report

The Workshop on Power Electronics in Transportation, WPET 2000, was held December 5-6, 2000 at the Hilton Novi in Novi, Michigan. The 2000 workshop addressed the topic 42V Power Systems for the Next 100 Years and was sponsored by IEEE Power Electronics Society and IEEE South-eastern Michigan Section in cooperation with the Society of Automotive Engineers (SAE) and the MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems.

WPET 2000 was the 6<sup>th</sup> biennial workshop focusing on the power requirements of vehicles. The need for a higher voltage for the automotive primary power supply system has gained prominence within the last few years. WPET 2000 provided a focus specifically on the 42 V systems and components that are being pursued from industry consortiums, standards organizations, individual suppliers and vehicle manufacturers.

The two-day technical program was divided into five sessions: Infrastructure Issues and Architecture, Energy Management/Conversion I & II, Semiconductors and Packaging, and 42V Subsystems. In addition to the fourteen papers that were presented, two panel discussions addressed the topics "Is 42V the real answer for increasing power demands in vehicles?" and "How will 42V systems impact semiconductors?"

The Keynote Luncheon Speaker was Dr. David Cole, the former Director of the Office for the Study of Automotive (OSAT) of the University of Michigan's Transportation Research Institute.

The workshop's focus and goal of attracting a limited but dedicated number of participants provided an informal environment conducive to interaction between presenters and attendees. While progress is being made towards a 42V standard, several challenges must be solved to have future vehicles capable of handling a 42V power bus.

Did you know ... that depending on the vehicle, every 10A of electric load reduces the fuel economy by 0.3 to 0.5 miles per gallon?

Randy Frank  
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## Educational Activities

I am very excited with the appointment to serve IEEE PELS as Educational Activities Committee Chair. It is my responsibility to work out with our members activities like development and review of proposals for educational programs, such as tutorials, seminars and short courses. It is also required in this position to provide liaison with IEEE and other professional educational organizations and staffs.



Power electronics is a key national need, essential for economic well being and security. Consequently, prospective students and the public at large need to be aware of the technological importance of power electronics by investing in new initiatives to promote the communication of technical information.

I come from an interdisciplinary educational background. I taught at the Department of Mechatronics at the University of Sao Paulo, Brazil, for several years. Now I am with Colorado School of Mines, Golden, Colorado, where their main mission is to provide a multidisciplinary education and research regimen at the intersection of traditional engineering, educating students for undertaking an Engineering Systems background. Power electronics has always fascinated me because it is the enabling technology that bonds such objectives to the industrial applications needs.

Serving now as IEEE PELS Educational Chair I want to emphasize the integration of power electronics educators, students and industry groups in valuable educational approaches. Such challenge can only be accomplished if you give me your feedback in how to further improve our policies and guidelines !

If you want to contribute in promoting videos based on your tutorials, publish tutorial summaries on this newsletter and make educational articles and self-study materials available in our web site, please send me an e-mail with your proposal and thoughts.

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## APEC 2001

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According to several longtime attendees, APEC 2001 was the "best ever;" it provided "fantastic audio/visual equipment" to clearly see the materials being presented, and "everything worked." What the attendee does not see is the behind-the-scenes effort by our conference management, conference committee, and local hotel staff to anticipate every possible scenario and have a contingency plan in place. One example was the decision to expand the number of booths for our exhibitors. Our initial floor plan provided 132 booth spaces for this year's conference. Due to strong exhibitor demand, our conference management team and exhibits chairman John Bassett expanded the layout to include 148 booths, 43 more than APEC 2000. Even with some cancellations we were successful in selling every booth space, setting another conference record. When you consider the current economy and our 10<sup>th</sup> consecutive year of selling out the exhibit hall, you can appreciate the "return on investment" which every exhibitor realizes from their participation at the APEC conference and exposition.

To monitor our performance with the exhibition aspect of APEC, three prizes were given out in our Tuesday evening drawings contingent on the response to a six-question survey. We continue to look for the "voice of the customer" with respect to our goal of continuous improvement in every aspect of APEC.

As one of the judges selected in counting the votes on questions relating to the best booth, best giveaway and happiest sales person, I can report that the ballot of one of our annual attendees contained manual punches, hanging chads and dimples. To protect the privacy of this individual, I will not give out Art's last name! Blue ribbons were given out and the ballot results were as follows: IR was selected for having the best booth, and Intersil was voted as having both the best giveaway (illuminating, clear, hard rubber balls) and happiest sales person. Three prizes were awarded for filling out the survey. Third prize, a Palm Pilot, was won by Gim Soon Wan, and second prize, a portable Panasonic DVD player, was won by Dennis Stephens. Doug McIlvoy, won first prize, a Compaq 12XL300 Notebook Computer. In reality, considering the unlimited "free" food and beverages served in the exhibit hall, we were all winners.

The APEC conference is an annual gathering where academic and industry leaders demonstrate the true benefits of

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## CONFERENCE ANNOUNCEMENT

32<sup>nd</sup> Annual

# Power Electronics Specialists Conference

June 17-21, 2001

Vancouver, BC, Canada

<http://www.conferences.ubc.ca/pesc2001>

**PESC<sup>®</sup> provides an international forum for power-electronics experts to present and discuss papers and new ideas on the latest advances and forward-looking topics in this fast-evolving field.**

- Technical program consists of 379 papers (229 oral and 150 poster presentations)
- Six Professional Education Tutorials
- ☆ NEW ☆ Industrial Exhibits
- ☆ NEW ☆ Poster sessions with 150 poster presentations
- ☆ NEW ☆ Special Student Session with Cash Prizes
- ☆ NEW ☆ Student "Wall Crawl" Design Competition with Cash Prizes
- Active social program for participants and guests, featuring regional tours, music, art, and food
- Presentations of the Newell, Richard M. Bass, and Distinguished Service Awards

**For additional information see the related article in this issue, visit the website given above, or contact the Secretariat.**

PESC 2001 Secretariat  
 UBC Conference Centre  
 5961 Student Union Boulevard  
 Vancouver, BC, Canada V6T 2C9

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 Email: [PELSC2001@housing.ubc.ca](mailto:PELSC2001@housing.ubc.ca)

**PESC is sponsored by the IEEE Power Electronics Society**

### Oh Danny Boy: the Story Behind the Performance

Some have suggested that it was a bit bold for an Australian to stand up and sing a very famous Irish song in Ireland. There's a story behind my performance of *Danny Boy* at PESC 00 in Galway, Ireland (see photograph in the October 2000 issue of the *IEEE PELS Newsletter*).

I first met Gerry Hurley at PESC 89 in Milwaukee. We met again at PESC '90 in San Antonio Texas, and decided to have a Guinness together in an Irish Tavern in the Hyatt hotel in San Antonio (a true mix of cultures).

There was a pianist there offering to play for anybody who was game to stand up

and sing, a sort of live Karaoke, but it was all Irish songs. After a few Guinness's, and some urging (René Spee was also there as I remember) I weakened, and did "Danny Boy".

Somebody came up to our table just after and asked what part of Ireland I came from. I replied "I'm not Irish, but my manager, (indicating Gerry Hurley), is". From that time on he's been my "manager", and has got me to sing in a few other Irish pubs in a few other part of the world.

He booked me for the Galway gig as soon as he was appointed general Chair PESC 2000. Thus it was an obligation. I strung him on, saying "probably not", "is the band any good?" "I don't have the

words" etc. He wasn't sure I was going to do it until I actually stood up and did it. It was really an acknowledgement of a very good friend, to thank him for his long-term support, and for his excellent conference organization.

Now I'm thinking of what odd performance I can lean on him to do when he come to PESC '02 in Cairns. Anybody got any suggestions?

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## Tricks of the Trade: A Simple Solar Cell Model®

One of the most important “tricks” in control system design is knowing how to model a system or device with just enough complexity but not too much. Does the model have enough detail to actually work? Does it really need to take absolutely everything into account? It is very difficult to determine how much detail is needed, especially since the overall behavior can depend on internal details.

Alternative energy sources such as solar cells or fuel cells can be very complex to model. For a solar cell, a full physical model must account for the quantum efficiency as photons of certain wavelengths split hole-electron pairs and lead to output current. Light intensity, wavelength, and temperature effects all require detailed model information. Even the cell capacitance is a non-linear function of a wide range of parameters.



For the purposes of power conversion, the internal physics are much less important. For example, in an outdoor-mounted panel, light intensity can be used with little regard for wavelength details (presumably sunlight is “white enough” to either work or not). A panel should be used to produce the maximum possible energy, so only at the maximum point is the capacitance really relevant. There are internal leakages and drops. In the end, a very simple circuit model, shown in Fig. 1, will support almost all the details we might need to design a power converter for a solar cell. This circuit is based on tests of a 10 cm full-wafer silicon crystal solar cell. The current source is approximately a linear function of intensity (the value is about 3.1 A under “standard one sun” conditions). The diode represents the physical behavior of the cell itself as a P-N junction. The capacitor (which I should have chosen based on lab ac measurements) reflects the depletion capacitance of this large structure at nominal output voltage of about 0.5 V. The model does give a correct picture of how current splits in parallel and series connections. It also gives a good model for losses, and gives excellent insight into how the solar cell will function in a converter. I often use many of these models in series to represent a complete panel.

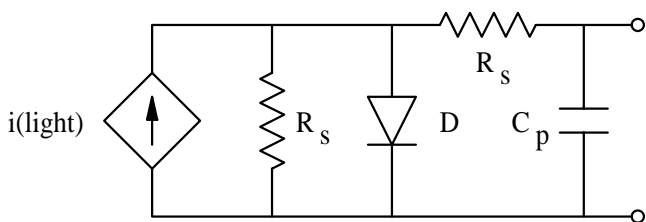


Figure 1. Solar cell model for power conversion.

The most common types of fuel cells, as it turns out, show rather similar behavior. In a fuel cell, the possible output current is a function of fuel flow. A fuel cell shows a current-limiting behavior just like a solar cell, although at a slightly higher voltage. The biggest distinction is in the dynamics. In a solar cell, the internal current changes almost instantly when the light intensity changes. Fuel cells have much higher capacitance because of large surface area, and follow changes to the input energy source much more slowly. There are internal pumps and compressors to regulate pressure, and all the equipment requires many seconds to come to steady

state. This kind of behavior can be modeled as a slow time constant between the fuel flow command and the internal current source. By analogy to a solar cell, this is equivalent to the internal current changing slowly over several seconds when the illumination changes. We have modeled such behavior with a slow R-C time constant at the control terminals of the current source. Even though these models are extremely simple, they support the key design needs of a power electronic system.

A PSPICE netlist is given for convenience.

### SOLAR CELL MODEL AND TEST CIRCUIT

\*P. T. Krein, 2001

\*Includes both a circuit model and a current-source test of  
\*a silicon solar cell, 10 cm size.

\*Set up for temperature and illumination steps for testing.

\*For these cells, the nominal output current is about 3 A.

\*The internal source is slightly higher (resistive drops.)

\*

```
.param imax=3.1
```

```
.step temp list 0 20 40 60 80
```

\*The internal current is approximately a linear function of  
\*white light illumination intensity.

```
*.step param imax 0.775 3.1 0.775
```

```
.tran 10ms 4s 0 10m
```

\*Here is the circuit model. Node 99 is the output.

\*Variables: isun — the photon-produced internal current

\* rsun — parallel leakage resistance

\* rs — output series resistance drop

\* dsun — the internal diode that limits voltage.

\* cparallel — the inherent parallel capacitance of a  
\* 10 cm diode

```
isun 0 97 dc {imax}
```

```
rsun 97 0 10
```

```
rs 99 98 0.5
```

```
cparallel 99 0 100n
```

```
dsun 97 0 dio
```

```
vsense 97 98 dc 0
```

```
.model dio D(Is=2n Rs=0.001)
```

\*Now, impose an external load current ramp to get the voltage

\*vs. current trace. Notice that when the current exceeds the

\*internal value, it will drive the voltage to extreme negative values.

```
itest 99 0 pwl(0 0 4 4)
```

\*To see the curves, plot v(97). Limit the vertical scale to (0,1).

\*The horizontal scale can be read in amps since the test current

\*has a slope of 1 A/s.

```
.end
```

Contributed by

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*Editor's note: You are invited to send your own favorite Trick of the Trade for publication in the PELS Newsletter. Just send it in any convenient medium, spelling out symbols such as Greek letters. Also, send along a recent photo, color or b/w of any size, for insertion along with your favorite Trick.*



present

# APEC 2002

## CALL FOR PAPERS AND SEMINARS

SEVENTEENTH ANNUAL

### Applied Power Electronics Conference and Exhibition

★ MARCH 10–14, 2002 • THE ADAMS MARK HOTEL • DALLAS, TEXAS ★

The Seventeenth Annual Applied Power Electronics Conference and Exposition (APEC 2002) will address the application of new components and circuits, design-oriented analysis techniques, and current trends in the design and manufacture of power electronic products and systems.

#### CONFERENCE HIGHLIGHTS

- Full technical program of presented papers.
- Professional Education Seminars on important topics for power electronics professionals including anyone involved in marketing, quality and manufacturing.
- Exposition featuring component, equipment and service leaders in the power electronics industry.

*Participation is solicited in all areas of power electronics, including those listed below. Suggestions for other related topics are welcomed and encouraged.*

- |                                   |   |                                      |
|-----------------------------------|---|--------------------------------------|
| • DC-DC Converters                | • Aerospace/Defense Systems             | • EMI & EMC Issues                   |
| • AC-DC Power Supplies            | • ICs for Power Electronics             | • Market Analysis & Strategies       |
| • Inverters & Cycloconverters     | • Design & Analysis of Magnetic Devices | • Product & Technology Roadmaps      |
| • Soft Switching Techniques       | • New Developments in Capacitors        | • The Voice of the Customer          |
| • Lamp Ballasts                   | • High Density Packaging                | • Identifying New & Emerging Markets |
| • Adjustable Speed Drives         | • Thermal Management                    | • Benchmarking Results               |
| • Power Factor Correction         | • Distributed Power Systems             | • Quality Programs & Data            |
| • Design For High Efficiency      | • Uninterruptible Power Systems         | • JIT & Material Management          |
| • Modeling & Analysis             | • Battery Systems                       | • Vendor Qualification               |
| • High Frequency Design           | • Electric Traction Systems             | • Manufacturing Processes            |
| • Control of Converters & Systems | • Automotive Applications               | • Design for Manufacturability       |
| • Simulation Tools & Techniques   | • Protection of Converters & Systems    | • Technology Transfer                |
| • CAD/CAE Tools & Techniques      | • Preventing & Controlling EMI          | • Standardizing Specifications       |
| • Power Semiconductors            |   | • Regulatory Requirements            |

#### DEADLINE FOR SUBMISSION OF ABSTRACT AND DIGEST IS AUGUST 3, 2001

Notification that a paper was accepted or declined will be **mailed no later than October 5, 2001**  
 Manuscripts in final camera-ready form will be due at the publishers **no later than December 7, 2001**

**Please note that papers presented at APEC must be original material and not have been presented at previous conferences or published before.**

Prospective authors are asked to submit a 50-word Abstract and a three-to-five page Digest of their planned presentation. Both the Abstract and Digest should be typed, double-spaced on 8 1/2"x11" paper. The heading of the Abstract must include: Title of the presentation, Corresponding Author(s), Affiliation(s), Mailing address, and Daytime telephone, Fax number and e-mail address. The heading of the Digest should include **the title only**. The Digest should clearly state: a) The purpose of the paper; b) The approach used; and c) The specific results. **Eight copies of all materials should be mailed to:**

#### APEC 2002

2000 L Street, N.W., Suite 710, Washington, DC 20036 • (202) 973-8664 • FAX: (202) 331-0111  
 For more information on exhibiting at the Exposition, call: (202) 973-8664 or FAX (202) 331-0111  
 or E-mail: [apec@courtesyassoc.com](mailto:apec@courtesyassoc.com) • Web site: [www.apec-conf.org](http://www.apec-conf.org)

APEC is sponsored by the IEEE Power Electronics and Industry Applications Societies and the Power Sources Manufacturers Association

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partnering. Having nine of the past ten General Chairman of APEC in attendance this year illustrates the good will and camaraderie of these individuals. Each of them represented one of our three sponsoring organizations during the past decade. Many of these past chairmen have remained very active in support of APEC through their current volunteer activities.

APEC is a multilevel conference in which component, power supply, and DC/DC converter manufacturers display their latest product offerings to meet current and future demands. They also participate as authors and session chairmen of our technical program. Having multilevel participation is a must if we are to focus on "time to money," an expression I prefer over "time to market." Let me illustrate an actual APEC experience.

As a chip manufacturer Intel Corporation's microprocessor group did not have direct interface with domestic power supply manufacturers. In 1993, I invited Steve Goodfellow and Scott Huck of their Pentium team to attend APEC in San Diego where they could meet with industry and academic leaders responsible for design and development of the next generation of products. Domestic power supply manufacturers were not aware of the output voltage changes required for powering future desktop computer systems. It is sad to report that very few attendees of that Marketing Session knew what the Energy Star program was all about, no less 3.3 volt outputs for PC's. As a result of that eye-opening experience Intel has recognized the need for early interface with us in addition to their customer base, to address the challenge of meeting end user demands for higher performance with smaller packages and lower system costs.

This year, at Don Staffiere's "Low Voltage Power, Who's In Charge?" RAP Session, Ed Stanford, Power Delivery Technologist of Intel, admitted that they "keep raising the bar—what are our limits?" With voltage requirements dropping below 1 volt within three to five years, we have our work cut out. While Intel is being driven by Moore's Law that calls for 0.6V at 290 amps within 10 years for high performance computers, we are being pressed to develop new capacitive and magnetic solutions to keep pace. Ed addressed DC resistance and inductance of the distribution as areas requiring close scrutiny. The current 1 gigahertz CPU (mid range system) has a high toggle

**PELS AdCom Meeting Minutes Summary**

The late winter meeting of the IEEE Power Electronics Society Administrative Committee (AdCom) was held March 4 at the Disneyland Hotel in Anaheim, California, on the opening day of the annual APEC conference co-sponsored by PELS. The meeting dealt with activities of the Society and charted courses for new projects.

Highlights of the meeting are summarized below. The complete meeting minutes can be found on the Society website at <http://www.pels.org>.

**Action Items**

- Ron Harley and Franco Profumo, with Phil Krein as an alternate, will be PELS nominees to the steering committee of the International Electric Machines and Drives Conference, co-sponsored by PELS.
- Harley and Krein will represent the Society on an Intersociety committee to develop an IEEE Power Electronics Magazine in conjunction with the Industry Applications Society and the Power Engineering Society.
- Harley, Krein and Arthur Kelley will present a proposal at the June AdCom meeting for power electronics letters to be available to members on-line.
- Marcelo Simoes will organize a plan for conference tutorials on Society-related topics.
- Enrico Santi will develop an organizing committee and a business plan for a videotape promoting power electronics.
- Krein will lead an organizing effort for creation of a PELS Society Magazine.
- Bob Myers will notify the organizer of

rate. We will be looking at di/dt with 100's of amps per microsecond. He anticipates a challenge of removing the heat in a cost effective manner. Intel's participation at the APEC conference confirms the need for all of us to work together if we are to achieve producible, cost effective solutions to the technology demands of tomorrow. In my opinion the answer to the "who's in charge" question will be decided by our ability to continue to work together on these future specifications which may require some mutually acceptable deviations.

The other two RAP Sessions were also highly attended and quite successful. Chuck Mullett moderated one on "Planar Magnetics: Hip or Hype," and Mark Jacobs moderated the other on "AC Versus DC for Back Up Power." Our policy of no videotaping or sound recording machine opened up some

an annual battery conference to delete PELS as a sponsor; the conference for several years has listed PELS as a sponsor but has never sought Society approval.

**Motions**

- Members approved presidential appointments of chairs to Society operating and technical committees and as PELS representatives to IEEE committees and boards.
- \$25,000 will be earmarked in the 2002 budget as support funding for Energy Challenge activities and \$10,000 will be allocated for creation of a videotape promoting power electronics.
- Two 2001 workshops — the Jordanian International Electrical and Electronics Engineering Conference in Amman, Jordan, 16-18 April and the International Electrical Engineering Conference in Bursa, Turkey, 7-11 November — were approved for technical (non-financial) sponsorship.
- The AdCom directed that a battery conference remove the Society as a listed sponsor.
- Gene Wester and Myers were authorized to determine whether to retain IEEE or select a new printer for the PELS Newsletter.
- The AdCom authorized a survey of the PELS membership and approved a questionnaire for distribution to members.
- AdCom at-large members Keyue Smedley and Rene Spee were appointed at-large members of the Long-Range Planning Committee.

*Submitted by Robert Myers  
PELS Administrator*

lively debate for all who participated in these Sessions. Although anyone can purchase copies of our Professional Education Seminar Workbooks and Conference Proceedings without attending the conference, he would miss out on the wealth of information obtained from attending our RAP Sessions. Attendance at the conference enables you to sit alongside your peers, have a soft drink or a beer, listen in or question any of the RAP session panelists, and challenge statements made by others at these wide-open forums.

Each of the three sponsoring organizations — IEEE PELS, IEEE IAS, and the Power Sources Manufacturers Association (PSMA) — conduct business meetings in conjunction with APEC. One such meeting, with standing room only, was a report

*Continued on page 10*



# COBEP 2001

## The 6<sup>th</sup> Brazilian Power Electronics Conference

Florianópolis, SC - Brazil

November 11 - 14, 2001

### CALL FOR PAPERS

The 6<sup>th</sup> Brazilian Power Electronics Conference (COBEP 2001) is being organized by the Brazilian Power Electronics Society (SOBRAEP) and by the Power Electronics Institute (INEP) of the Federal University of Santa Catarina, Brazil. The congress will take place in Florianópolis, state of Santa Catarina, southern Brazil. The aim of this conference is to provide a forum for the discussion for Brazilian and foreign experts in the Power Electronics area, featuring strong participation of industry and academia.

A list of relevant topics includes, but it is not limited to the following:

1. Power semiconductor devices, components and magnetics;
2. DC/DC converters and DC power supply systems;
3. DC/AC and AC/DC converters for power supply and UPS applications;
4. Energy storage;
5. Electric machines, motor drives and motion control;
6. Control theory applied to power electronics systems;
7. Computer-aided modeling, analysis, design and synthesis of power electronics systems;
8. Harmonics and reactive power compensation and high power factor AC/DC converters;
9. Power quality, electromagnetic compatibility (EMC) and electromagnetic interference (EMI);
10. Power electronics in generation, transmission and distribution and renewable energy systems;
11. Automotive, aerospace, transportation and utility applications of power electronics;
12. Integration, packaging and modules;
13. DSP applications;
14. Electronic ballast for lighting;
15. Education in power electronics.

#### Information for authors

Authors are invited to submit a copy of an extended digest in English of no less than four pages and no more than six pages through the following internet address: [www.sobraep.ufsc.br/cobep2001](http://www.sobraep.ufsc.br/cobep2001). The instructions for the electronic submission of the digests will soon be available at the conference web page.

The accepted papers can be presented at the Conference in English, Portuguese or Spanish. The overhead transparencies or slides, however, must be prepared in English.

**Deadline for submission of digest:** May 11, 2001

**Notification of acceptance:** July 9, 2001

**Final version of the paper:** August 31, 2001

#### About the Venue

Florianópolis, the capital of the state of Santa Catarina, is a pleasant city of approximately 300,000 inhabitants, located on the Island of Santa Catarina on the southern Atlantic shore of Brazil. The Island of Santa Catarina has 42 spectacular beaches, making it an important tourist city of southern Brazil and for the Mercosul countries. Several daily flights connect the city with São Paulo and Rio de Janeiro with immediate connections to North America and Europe. The Conference will be held at Praiatur Hotel, a high class hotel located at Ingleses beach in the north of the island. In the region of Florianópolis there are two public and several private universities. The city is also becoming an important center of development in the automation and electrical engineering area as a result of public and private investments.

**Please, address any question about the Conference Program to COBEP 2001 Program Chair:**

**Prof. Enio Valmor Kassick**  
 Instituto de Eletrônica de Potência - INEP  
 Universidade Federal de Santa Catarina  
 Caixa Postal 5119  
 88040-970 Florianópolis - SC  
 Brasil  
 e-mail : [kassick@inep.ufsc.br](mailto:kassick@inep.ufsc.br)

**For conference information or other inquiries:**

**COBEP 2001 General Chair:**  
**Prof. Alexandre Ferrari de Souza**  
 Instituto de Eletrônica de Potência - INEP  
 Universidade Federal de Santa Catarina  
 Caixa Postal 5119  
 88040-970 - Florianópolis - SC  
 Brasil  
 e-mail : [alex@inep.ufsc.br](mailto:alex@inep.ufsc.br)

Further information about the Conference, accommodation and social events are available and will be continuously updated at the following internet address:

<http://www.sobraep.ufsc.br/cobep2001>

**PESC® '01 Final Plans** *from page 1*  
hibitor hall over the course of 2 poster sessions and there is no implication that they are of any lower quality than those presented orally. We expect all the oral presentations to use electronic projection techniques.

PESC 2001 has introduced the first truly electronic approach to managing the PESC conference papers. The submission and review of digests was completed under the direction of Program Chairs Annette von Jouanne and Alan Wallace, and the preliminary program and list of papers is now posted on the conference website.

There will be ample opportunities for exchange of ideas and information outside the formal paper sessions. We will have six Sunday tutorials and the traditional evening discussion sessions on Tuesday. To emphasize the participatory nature of these sessions, we have renamed them Brain Power Groups (BPG) rather than "rap" sessions. The list of topics and moderators is posted on the website.

Details of confirmed industrial exhibitors are on the website, but more space can be made available, so interested companies are encouraged to join us. Full information and application forms are available on the website, or you may contact the secretariat at [pesc2001@housing.ubc.ca](mailto:pesc2001@housing.ubc.ca). Sponsorship opportunities are also available and interested companies are invited to contact the secretariat for details.

Many companies with power related activities—which means almost anyone involved with hardware—are seeing a shortage of new graduates with the required power electronic capabilities. We are particularly keen to encourage student participation at PESC 2001. This includes students at all levels, with both the competition and student paper session open to all. The student events will take place on Wednesday. The Wall Crawl, with a C\$4000 prize, will take place at lunchtime, and student poster sessions will be open during the coffee breaks. Further details can be found on the conference website.

PESC 2001 will be held at the University of British Columbia (UBC). Superbly situated at the tip of the Point Grey Peninsula with expansive views over the Pacific Ocean, the Coast Mountains, and the Vancouver skyline, the UBC is the second largest university of Canada. The UBC boasts some of the city's best attractions, including the Museum of Anthropology, the Chan Centre for the Performing Arts and the UBC Botanical Gardens. Sports enthusiasts will enjoy the Aquatic Centre with two

Olympic-sized pools, tennis courts, and the 18-hole University Golf Course. Pacific Spirit Regional Park surrounds the campus with 763 hectares of mature coastal rainforest providing 35 kilometres of walking and biking trails, many leading directly to sandy beaches. The campus is a secluded haven, yet only 20 minutes from Vancouver International Airport and 10 kilometres from downtown Vancouver.

An exciting social program is planned for both delegates and their guests. A concert and reception will be held in the state-of-the-art Chan Centre for the Performing Arts, both an architectural and an acoustic marvel. The conference banquet will be a traditional First Nations salmon barbecue on the grounds of the Museum of Anthropology, a spectacular award-winning building designed by renowned Canadian architect Arthur Erickson to reflect the post-and-beam structure of Northwest Coast Indians. Delegates and guests will have an opportunity to view the exhibits, emphasizing the artistic achievements of the Northwest Coast Indians, either on their own or with the knowledgeable Museum guides, and to purchase unique gifts in the Museum Shop.

The guest program includes a "get acquainted" breakfast on the first day followed by a bus tour of Vancouver with lunch in beautiful Stanley Park. Guests may choose from a selection of tours showcasing both Vancouver and its surroundings. Planned events are a trip across the Strait of Georgia to beautiful Vancouver Island with a visit to the world-renowned Butchart Gardens and time to explore Victoria's scenic harbour; a visit to the year-round recreational paradise of Whistler Resort with a ride up to the top of the mountain for lunch; and a guided walking tour of Vancouver's Chinatown with a visit to the Chinese Cultural Centre Museum and an authentic Chinese lunch.

Your host city, Vancouver, is set amid majestic mountains, evergreen forests, and the sparkling blue Pacific Ocean. Clean and safe and blessed with a mild climate, this cosmopolitan city offers an unending array of activities, reflecting both the grandeur of its surroundings and the multiculturalism of its residents. Stanley Park, Canada's largest urban park is home to the world-renowned Vancouver Aquarium. A city of diverse neighbourhoods, Vancouver boasts Canada's largest Chinatown, the century-old Gastown area, and fashionable Robson Street for luxury shopping. A vast selection of restaurants, many with international award-winning chefs, offers cuisine from all parts of the world to suit all tastes and

budgets. Vancouver is the ideal starting point for pre or post-conference travel throughout British Columbia, Alberta and Washington State. Outdoor enthusiasts can enjoy a wide variety of activities such as hiking, fishing, boating, golfing, and sightseeing. Vancouver also serves as the departure point for cruises to Alaska.

If you plan on arriving a day or two early, you may wish to join a Sunday excursion. The historic Royal Hudson steam train takes you on a leisurely two hour trip along scenic Howe Sound to Squamish, where you will board the MV Britannia to cruise back to downtown Vancouver in time to return to UBC for registration and the opening reception.

In addition to conference information the PESC 2001 website has links to detailed information on The University of British Columbia, Vancouver, and the Province of British Columbia. I look forward to seeing you in Vancouver in June.

*Bill Dunford*  
General Chair, PESC '01  
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## President's Message *from page 1*

Therefore, this is an excellent existing avenue for dissemination to engineers unable to attend a conference. I want to challenge practicing engineers in industry, as well as professional educators, to consider writing high quality tutorial papers based on their wealth of experience.

As you may know, PELS is also working toward the introduction of new educational products that are readily available. We are now in process of determining which of our tutorials can and will be the basis of tutorial videos. These videos will then be sold as IEEE products. Finally, our Newsletter is always looking for practical engineering articles such as the "Tips of the Trade" column. Your Society needs you. I would again like to invite interested members to consider submitting tutorial papers and practical articles and "share the wealth!" Feel free to send your comments or opinions to myself, or Marcelo Simoes, PELS Education Chair, Colorado School of Mines, [msimoes@mines.edu](mailto:msimoes@mines.edu).

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**APEC 2001***from page 7*

to the PSMA by Fred Lee on behalf of the Center for Power Electronic Systems (CPES). CPES is an alliance of 5 universities and over 90 companies whose mission is to provide research in the area of technological development in power electronics where member firms gain early access to intellectual property. For additional information on CPES, simply visit their web site at [www.cpes.vt.edu](http://www.cpes.vt.edu).

The conference opened on Sunday morning with five of the 15, half-day, Professional Education Seminars being presented by seasoned industry and academia professionals. Prior to the conference, the committee selected 15 of the 29 proposals received which would appeal to the widest cross section of APEC attendees. With ongoing user demand for higher power densities, it was not surprising to find a "packed house" during both Dan Jitaru and Bruce Carsten's presentations on Monday morning. Attesting to the continuing popularity of the Professional Education Seminars, 390 engineers showed up to attend these tutorials.

Attendees at this year's conference came from over 24 foreign nations representing every continent of the globe: Austria, Australia, Brazil, Canada, Chile, China, Denmark, Finland, Germany, Hong Kong, India, Ireland, Israel, Italy, Japan, Korea, Mexico, Singapore, Slovenija, South Africa, Spain, Sweden, Switzerland, Taiwan, and the UK. Many of these engineers were authors at APEC 2001. On behalf of the entire conference committee, we extend our sincere gratitude for their contributions to our success. Although we accepted 198 technical papers for APEC 2001, we were still unable to accommodate over 50% of the 435 received for consideration. In recognition of that challenge the Steering Committee has discussed another expansion of the technical program to offer six (rather than five) sessions in parallel. That decision will be made as the committee reviews the abstracts received for APEC 2002.

With 735 paid attendees, APEC's technical registration surpassed the 2000 record set for this segment of the conference. This total does not include booth staff who were granted access to the technical sessions. Close to 600 people attended the Plenary Session where Bill George, Senior Vice President and Chief Manufacturing and Technology Officer of ON Semiconductor, opened this session with a reference to the current energy crisis in California. His pre-

**Announcement and  
Call for Papers  
ELECO 2001**

**Second International Conference  
on Electrical and Electronics Engineering**

**7 – 11 November 2001**

**Bursa, Turkey**

<http://www.elk.itu.edu.tr/eleco2001>

**Purpose:** To provide a forum for electrical and electronics engineers and scientists in academia and industry, to present their works and to share their experiences in the field of electrical and electronics engineering. More information can be obtained from the conference website given above.

**Deadline:** Submittal of full paper by **15 July 2001**

**Venue:** Bursa, the first capital of the Ottoman Empire is a picturesque city located in the foothills of Mount Uludag amidst green countryside and forest. The city is filled with gardens and parks and overlooks a verdant plain. Bursa was and still is famous for its silk trade, textile manufacturing, and thermal springs. The cultural heritage of the city includes monuments, imperial mosques, mausoleum caravanserais, typical old houses and a covered bazaar dating to Ottoman times.

**Information:** The Chamber of Turkish Electrical Engineers  
Bursa Section  
Tahtakale Veziri Cad. Kent Ishani Kat 4  
16040 Bursa, TURKEY  
Tel: +90 (224) 225 15 05 or +90 (224) 223 02 41  
Fax: +90 (224) 223 57 15  
Email: [emob@netone.com.tr](mailto:emob@netone.com.tr)

**Organizers:** The Chamber of Turkish Electrical Engineers, Bursa Section  
Uludag University, Faculty of Engineering  
Istanbul Technical University, Electrical and Electronics Faculty

**Technical Co-Sponsors:**  
IEEE Power Electronics Society  
IEEE Circuits and Systems Society, Turkey Chapter

sentation was appropriately titled "Power Management: Enabling Technology for Next Generation Electronic Systems." He was followed by past Conference Chairman Dong Tan, whose paper was titled: "Standardizing Specification Language: IEEE Standard 1515-2000." The object of this standards activity was to create an industry understanding of specifications with respect to test methods and measurements, not to establish the actual specification. The final presentation, "Requirement for Robust Capacitors in High Density Power Conversion" was presented by co-author Ian W. Clelland of ITW Paktron. Ian concluded that we must carefully select components with a proven track record of both durability and reliability to achieve the required reliability levels for most applications. By reducing the Plenary Session to three vital presentations, we were able to add five additional four-paper

Sessions that afternoon.

Although there was no theme for APEC 2001, it was apparent that everyone was aware of the challenges being faced to provide low-voltage outputs at higher currents in the next few years. Over 100 attendees listened to Bob Mammano's discussion of this topic as presented in the TI Exhibitor Seminar on Tuesday afternoon.

Another annual APEC highlight, the Micromouse competition, was very popular again this year. Over 150 people came to witness the contest in which 11 mice (and their handlers) representing Canada, Korea, Singapore and the United States were all eager to capture the "big cheese." The fastest run (10.82 seconds) and best score (13.52 seconds) were both achieved by "L.N.G." representing the Korean entry. Handler Oh Kil-Young is a student at Hoseo University in Korea. He was also the winner of the 20<sup>th</sup>

*Continued on page 11*

## Major PELS Awards to be Presented at PESC® 2001

The annual PELS Awards Banquet will be held on Thursday evening, 21 June 2001, in Vancouver, BC Canada at PESC(R) 2001. The William E. Newell Power Electronics Award will be presented for the twenty-fifth year. The PELS Distinguished Service Award and the Richard M. Bass Outstanding Young Power Electronics Engineer Award will be presented for the fifth year. The Society will also present the PELS Transactions Prize Paper Awards to the authors of the three papers judged by the Associate Editors to be the best papers published in the PELS Transactions in 2000.

The ceremonies will also recognize members of PELS who were elected to IEEE Fellow Grade effective 1 January 2001.

The new PELS Best Chapter Award will be presented for the second year.

A ticket for the Awards Banquet is included in the registration fee for IEEE Members and non-Members, students and IEEE Life Members. Tickets for your guests are included in the Guest registration fee. The advance registration form is available at the PESC 2001 web site, which is linked to the PELS web site <http://www.pels.org>.

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## APEC 2001

from page 10

All Japan Micromouse contest held in Tokyo last year. Finishing in second and third place were Min 2 and Ning 2, two of the entries from Singapore. VI-Mouse was the first Micromouse entry representing Vicor Corporation in an APEC competition. Perhaps we will see other manufacturer entries in future contests.

During the seminars and technical sessions on Monday and Tuesday, Spousal Arrangements Chair, Jane Wilson, hosted two breakfasts preceding the two tours into LA. On Monday's tour, every one of the 55 seats on the "I Love LA" motor coach tour were occupied. Although they did experience some rain, they visited the renowned Rodeo Drive where they passed such business locations such as Adolfo, Hermes, Gucci and Cartier. Forty-one spouses took our Tuesday bus trip to the Getty Center where they explored the vast collection of European paintings, sculpture and decorative arts. The collection includes paintings by Monet,

## IEMDC '01 to be Held at MIT

The IEEE International Electric Machines and Drives Conference (IEMDC) will be held on the campus of the Massachusetts Institute of Technology (MIT) from June 17 to 21, 2001. *[Due to an unfortunate scheduling oversight, IEMDC '01 is scheduled on the same dates as PESC '01. — Editor]* The conference is jointly sponsored by the IEEE Power Engineering, Industry Applications and Power Electronics Societies. It follows successful IEEE/IEMDC conferences held in Milwaukee in 1997 and in Seattle in 1999.

IEMDC provides an international forum for sharing of experience, new ideas, and developments in design, analysis, new materials utilization and optimization techniques for drive systems and components. The conference will address the technical communication needs of the ongoing advance in the application of electric power to mechanical functions. Also included are practical applications, operations, maintenance, and the development and harmonization of standards for drive systems. IEMDC is a venue for users, designers, and analysts of electric machines and drives, and related power electronics and controls.

This year, In addition to papers of general applicability, IEMDC '01 will feature special sessions on three new technical tracks:

- Automotive Electric Drives and Controls

- Large Turbogenerators
- Digital Control for Electric Machines and Drives

These tracks will provide a separate focus on the technical subjects of this conference, as used and/or proposed for use in the target industry. Papers for each respective track will be reviewed by an industry-specific panel, and special sessions at the conference will be devoted to these papers.

In response to the Call for Papers, over 180 papers and paper summaries have been submitted and were reviewed by a panel of experts. The program will consist of two plenary sessions with invited speakers, twelve oral presentation sessions and two poster sessions. A trade show will give exhibitors a chance to show off their wares to conference participants. A social program and tour opportunities will accompany the technical work of the conference. See <http://power.mit.edu/iemdc> for the preliminary conference schedule, registration and housing information, and for information on exhibiting at the conference.

MIT is located in Cambridge, just across the Charles River from Boston, which because of its role in American History is a favorite tourist destination. June, with its fine weather, is an excellent time to visit Boston.

Jim Kirtley  
Program Chair, IEMDC '01  
Email: [kirtley@rcn.com](mailto:kirtley@rcn.com)

Renoir, and Cezanne and sculptures by Cellini, Bernini, Houdon and Canova.

I doubt that any of the 750 attendees who joined our private Wednesday evening banquet will ever forget the magical setting of fantasy and fun as presented by Disney for our group in the Festival Arena. The menu included butternut squash soup, a salad containing mixed greens with walnuts and gorgonzola cheese followed by a choice of spinach stuffed chicken breast and delicately seasoned pork slices. While dining we had an unobstructed view of Disney cast members entertaining us with their dancing, juggling, fire eating and live music. After dinner we walked to the Tomorrowland area where we had unlimited access to several attractions including: Honey I Shrank the Audience, Star Tours, and Space Mountain. There were multiple areas to indulge ourselves on a wide variety of decadent desserts from cheese cake, lemon squares, double chocolate brownies to rich bread pudding and blueberry truffle. Disney characters mingled and posed for photo oppor-

tunities with our members.

APEC 2002 will be held March 10-14 at the Adams Mark Hotel in Dallas, Texas. Anyone interested in submitting a technical session proposal of practical importance in any area of power electronics should submit a 50 word abstract and a three- to five-page digest (via mail only) to APEC 2002, 2000L Street NW, Suite 710, Washington, DC 20036. The deadline for submission of abstracts and digests is August 3, 2001. We are also seeking half-day professional education seminar proposals. Please note that papers presented at APEC must be original material and not have been presented at previous conferences or published before.

For additional information on any aspect of APEC please refer to our web site [www.APEC-conf.org](http://www.APEC-conf.org) or contact our conference management at +1 202 973 8664, FAX +1 202 331 0111, or email [apec@courtesyassoc.com](mailto:apec@courtesyassoc.com).

Larry Gilbert  
APEC 2001 Local Arrangements and  
Publicity Chair

## Meetings of Interest to PELS Members

**ISPSD'01, the 13th International Symposium on Power Semiconductor Devices & ICs**, will be held June 4–7, 2001 in Osaka, Japan. ISPSD'01 is sponsored by The Institute of Electrical Engineers of Japan, and co-sponsored by the IEEE Electron Devices Society. For more information visit <http://www.rdd.kepco.co.jp/ispsd/>.

**PESC® 2001, the 32<sup>nd</sup> Annual IEEE Power Electronics Specialists Conference**, will be held June 17–22, 2001 at the University of British Columbia in Vancouver, Canada. PESC is sponsored exclusively by the IEEE Power Electronics Society. For additional information see the related article in this *Newsletter* and visit <http://www.conferences.ubc.ca/pesc2001>.

**IEMDC 2001, the 3<sup>rd</sup> IEEE International Electric Machines & Drives Conference**, will be held June 17–20, 2001 at Massachusetts Institute of Technology in Cambridge, MA, USA. IEMDC is jointly sponsored by MIT and the IEEE Power Engineering, Industry Applications, and Power Electronics Societies. For more information contact Professor James L. Kirtley, Jr. at [kirtley@mit.edu](mailto:kirtley@mit.edu) or visit <http://wer.mit.edu/IEMDC>.

**The Summer Meeting of the IEEE**

**Power Engineering Society** will be held July 15–19, 2001 at the Hotel Vancouver in Vancouver, BC, Canada. Visit the website <http://www.ieee-spm2001.org> or contact [yakout.mansour@bchydro.bc.ca](mailto:yakout.mansour@bchydro.bc.ca) for further information.

**TENCON 2001, the IEEE Region 10 International Conference on Electrical & Electronic Technology**, will be held August 19–22, 2001 on the SuperStar Virgo Cruise departing from Singapore. For details see <http://www.ieee.org.sg/tencon2001/>.

**EPE 2001, the 9<sup>th</sup> European Power Electronics Conference**, will be held at Grazer Congress Center in Graz, Austria on August 27–29, 2001. For complete information, see <http://epe2001.unileoben.ac.at>.

**INTELEC® 2001, the 23<sup>rd</sup> International Telecommunications Energy Conference**, is set for October 14–18, 2001 in Edinburgh, Scotland. PELS is a technical co-sponsor. Visit <http://www.intelec.org> for additional information.

**PEDS'01, the International Conference on Power Electronics and Drives Systems**, is planned for October 22–25, 2001 in Bali, Indonesia. PEDS '01 is held in technical cooperation with the IEEE Industry Applications and Power

Electronics Societies. For further information see <http://www.ieeepecs.org> or contact Yanuarsyah Haroen at [yanuar@elga.net.id](mailto:yanuar@elga.net.id).

**ELECO 2001, the International Conference on Electrical & Electronics Engineering**, will be held November 7–11 in Bursa, Turkey. The deadline for submittal of full papers is July 15. PELS is a technical co-sponsor. Visit <http://www.elk.itu.edu.tr/eleco2001>, or see the call for papers in this issue of the *Newsletter*.

**COBEP 2001, the 6<sup>th</sup> Brazilian Power Electronics Conference**, is scheduled for November 11–14 in Florianópolis, SC - Brazil. Digests are due May 11. PELS is a technical co-sponsor. For additional information, see this *Newsletter* or visit [www.sobraep.ufsc.br/cobep2001](http://www.sobraep.ufsc.br/cobep2001).

**APEC® 2002, the 17<sup>th</sup> Annual IEEE Applied Power Electronics Conference**, sponsored by the IEEE Power Electronics Society, the IEEE Industry Applications Society, and the Power Sources Manufacturers Association, will be held at the Adams Mark Hotel, Dallas, TX, USA, March 10–14, 2002. See <http://www.apec-conf.org> and the related call for papers in this *Newsletter* for details.

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