



## The President's Message Part of the System

At a recent seminar I attended, the speaker was projecting the design requirements for the next few generations of microprocessor. The voltages keep dropping,



and the last number on his projection list showed a processor drawing 0.6 V with 100 W load. This was explained as a great step forward in power efficiency. My only

hope is that there is a power electronics engineer on the design team who can help them figure out how to deliver more than 150 A into the chip while keeping the power conversion drops at a small fraction of the load voltage. Will the system efficiency really improve based on this set of load requirements?

At another seminar, the speaker talked about high-reliability utility supplies. The design objective is to keep ac mains power up and running under all conceivable scenarios. Somehow, the speaker assumed that the backup generator (and its power electronics) would be ready all the time, and would not be subject to the usual failure modes. I suspect that a power electronics engineer had not been asked to comment on backup power system design and reliability. I have also heard horror stories about alternative energy systems, in which the power electronics fails every week, and everybody assumes that engineers in our area are basically inept (even though they might not have actually been involved in the system design).

More and more, power requirements in computers, automobiles, telecom systems, and other areas are exceeding levels many of us thought to be impractical. At the same time, many companies still give the specs to power supply designers or vendors at the end of the process. The trend in other companies is toward teamwork, both internally and with customers. Surely this is the only way to meet such difficult requirements. We would be interested in case histories that some of our readers might share. These might show the foibles of "serial" design with the power electronics at the end, or they

*Continued on page 5*

## New Senior Members

Three members of PEELS were elevated to Senior Member grade at the IEEE Admission and Advancement Panel meeting held 26 June 1999 in Boston, MA. The new Senior Members are:

- Iqbal Husain, University of Akron
- Yilu Liu, Virginia Polytechnic Institute and State University
- Emil A. Levi, Liverpool John Moores University

In addition, since Iqbal Husain was nominated by a Section or Society as part of the 1999 Nominate a Senior Member program, the nominating Section/Society will receive a \$10 acknowledgement for having initiated this elevation.

## Nominations Sought for Society Awards

*Chris Riddleberger, PEELS Awards Chair*

Nominations are sought for all three of the Power Electronics Society's major awards for 2000. All nominations must be received by the Awards Committee Chair by January 15, 2000.



The year 2000 will mark the fourth year of our two newest awards—the PEELS Distinguished Service Award and the Richard M. Bass Outstanding Young Power Electronics Engineer Award. The latter award was renamed in 1999 in honor of the late Professor Richard Bass, former treasurer of the Society, who died in an automobile accident in April 1999. The William E. Newell Power Electronics Award will be presented for the twenty-fourth year.

The nomination and selection procedures for the three awards are similar. For each award, a Nominating Committee is responsible for identifying worthy candidates. Additionally, a general solicitation of nominations is made through this Newsletter article. A separate Selection Committee then ranks all the nominees in priority order. If there are more than three candidates, a second ballot is prepared with

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## APEC 2000 Returns to New Orleans

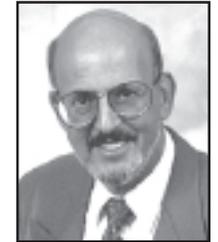
*Larry Gilbert, APEC Publicity Chair*

APEC 2000 returns to New Orleans, home of the annual Mardi Gras parade. Mardi Gras is a French phrase meaning "fat Tuesday" (the day before Ash Wednesday). "laissez les bons temps rouler"—let the good times roll. New

Orleans, site of the first and third Applied Power and Electronics Conferences (1986/1988), will be the location for APEC 2000, the fifteenth annual APEC Conference and Exposition. Although some visitors come to New Orleans in search of pirate Jean Lafitte's buried treasure, APEC attendees are more practical. We attend this conference knowing that "treasure" can be every professional education tutorial and technical session offered by the APEC committee.

The Fairmont Hotel is just a few short blocks away from the world famous French Quarter where you can purchase original beignets and cafe au lait, Cajun or Creole cuisine, or a Pat O' Brien's "hurricane"

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## Tricks of the Trade

### Sizing the MOSFET Gate Damping Resistor<sup>©</sup>

Contributed by Marc Thompson

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Reading a recent "Tricks of the Trade" on MOSFET gate capacitance [1] made me think about the ubiquitous 10 Ω gate resistor, and the reasons why it is always present in high speed switching circuits. Look at any schematic with a high-speed switched MOSFET with gate driver, and inevitably there is a small-valued gate resistor, in the 5 Ω - 20Ω range. Now, why is it there? Sure, it's there to "damp the gate circuit" but let's try and put some more firm numbers to it.

Granted, this is not a particularly well-

posed problem, but let's wave our hands a bit. For instance, assume that the input capacitance including all MOSFET capacitances, Miller effect and the like can be modeled as a single lumped capacitance



$C_g = 1000$  pF. We know this isn't likely to be accurate, as the gate capacitance is non-linear with gate-source and gate-drain voltage, but we have to start somewhere. Note that

if you parallel MOSFETs, the capacitance that you drive necessarily increases as well.

Furthermore, let's assume that we have built our circuit on a 2-layer PC board (thickness 0.062" or 1.6 mm) and the MOSFET is driven by a driver chip 2 centimeters away. We've added a nice wide PC board trace 0.040" (1 mm) wide from the gate driver chip to the MOSFET gate. Now, what is this circuit going to do?

Assuming that the trace runs over a ground plane, we can model the interconnection from the gate driver to the MOSFET as a microstrip with lumped inductance of value:

$$L_p = \mu_o l d / w$$

where  $\mu_o = 4\pi$  nH/cm,  $l$  is the trace length (2 cm),  $w$  is the trace width (0.1 cm) and  $d = 0.16$  cm is the distance from the trace to the ground plane that should be under the trace. In this case, the parasitic gate inductance  $L_p = 40$  nH, which is reasonable given normal PC board geometries. If we want, we can add the gate inductance (5-10 nH) but the overall result won't change much.

Now, we know that this LC circuit will ring, and in this case the resonant frequency is approximately 25 MHz. Furthermore, a linear undamped LC circuit will ring to twice the final value, which could be destructive for the MOSFET gate (for instance if you drive from a 12V gate driver chip, and the maximum MOSFET  $V_{gs}$  rating is 20V). We

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## Editorial

While putting the finishing touches on my first issue as editor, I decided to use this opportunity to make some editorial comments.

First, I would be remiss not to acknowledge the high standard raised by the PELS Newsletter founding editor, Harry Owen. As I am slowly learning to use PageMaker, I am quickly learning an appreciation of Harry's immense contribution to the newsletters. He not only implemented the concept, but he got the job done with friendliness, expertise, respect for colleagues, statesmanship, and professionalism in every way. He has been tremendously helpful in transferring how-to technology to me. His are big shoes to fill.

I would also like to acknowledge my employer's generous support for part of the time required for my editorial activities.

For the record, my perception of my role as editor is to compile articles and information that you, the members, have contributed. The newsletter is your communication tool, not mine, and it relies on your inputs.

Much of this issue has been put together at the last moment after I reached an enabling threshold for using the layout software. Consequently, in some cases I made interpretative assumptions and editorial changes to submitted articles without the benefit of feedback from the contributing authors. My general preference, however, is to ask whenever I have questions. If I guessed and got it wrong, let me know and I will publish a correction in the next issue.

My intent is not to change anything substantial regarding the newsletter until I learn and understand the baseline process; e.g., crawl, before walk, before run. For the longer term I am open to suggestions. Please send in your suggestions of all types, including content, format, etc.—both what you would like to include and what to avoid in the newsletter.

One change under consideration is to slide the publication dates by one month. That would move the deadlines to approximately one month after our major conferences and would allow more time for contributors to submit conference reports in a timely manner. Let me know what you think.



by Gene Wester

### IEEE Power Electronics Society Officers

Philip Krein, President  
Thomas Habetler, V. P., Operations  
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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; e-mail: [gwester@ieee.org](mailto:gwester@ieee.org). Deadlines for copy are March 15, June 15, September 15 and December 15. Submission of items by e-mail in plain-text format is preferred. Plain-text (straight ASCII) submissions on diskettes of either size are welcome. A backup printout should be mailed with a diskette. 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 high-quality hard copy.

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September 10-14, 2000  
Hyatt Regency Phoenix at Civic Plaza  
Phoenix, Arizona

## CALL FOR PAPERS

The 22nd **International Telecommunications Energy Conference (INTELEC®)** is an international forum for the exchange of information on energy and power for communications systems. The conference provides an opportunity for designers, manufacturers, distributors and users to discuss a wide variety of topics related to power systems, components, and energy storage technologies.

The INTELEC 2000 theme is **Powering Network Convergence in the New Millennium**. The keynote and plenary speakers will discuss the changing power needs of our industry as we move into the 21st Century and will deal with the accelerating convergence of voice and data. Over 120 technical papers, covering virtually all aspects of telecommunications power will be presented. Several workshops, tutorials and an exhibition of power equipment used in communications networks are also scheduled the conference. Over 900 representatives from more than three dozen countries are expected to attend.

### Scope of Conference

Topics for the technical papers to be presented include, but are not limited to, the following:

- Integrating the diverse power requirements of cable, wireless and the Internet
- Batteries - energy storage systems and devices
- Power for cellular and personal communications systems
- Cable system operation, administration and maintenance
- Power challenges of high-power multimedia networks
- Power for cable TV
- New technology power generation and energy storage systems
- DC Power Plants - rectifiers, distribution, computer supervision, remote monitoring and control
- Power system architectures
- Flywheel energy storage systems
- DC/DC Converters - topologies, design and simulation
- AC Power Supplies - inverters, UPSs, power supplies for computer systems and terminals
- Prime Power Systems - engine-alternators, fuel cells, solar and wind systems
- Building and Environmental System Design - energy conservation techniques
- Physical and Thermal Design - energy-efficient design
- Electromagnetic Compatibility - EMI, ESD, EMP
- Grounding and Bonding of equipment, systems and buildings
- Standards and Specifications

You are cordially invited to propose suitable topics for nonoverlapping workshops on subjects of special interest.

### Abstracts And Manuscripts

An abstract that accurately reflects the content of each proposed technical paper must be received by the Program Committee **not later than February 1, 2000**. The abstract should not be shorter than 250 words and not longer than 500 words. It must include all information considered necessary by the authors to demonstrate the technical merit of the paper. Abstracts can be sent via fax, e-mail or regular mail. Please direct all abstracts to:

|                         |  |
|-------------------------|--|
| INTELEC 2000            | Phone: +1 619-565-9921   |
| PCMI                    | Fax: +1 619-565-9954   |
| 7916 Convoy Court       | E-Mail: <a href="mailto:INTELEC@pcmisandiego.com">INTELEC@pcmisandiego.com</a> |
| San Diego, CA 92111 USA |  |

Manuscripts of accepted papers will be included in the Conference Proceedings, which will be distributed at the conference. The length of each manuscript must not exceed eight single-spaced typewritten pages, tables and figures included. Abstracts, manuscripts, and oral presentations will be in English. Detailed instructions on format will be mailed to those authors whose abstracts have been accepted. Where multiple authors are involved, please indicate to which author the mail should be addressed. **The accepted manuscripts are due no later than June 1, 2000.**

### Exhibits

Exhibits featuring power equipment and related products will complement the technical sessions. Companies wishing to reserve exhibit space are invited to contact:

|                       |  |
|-----------------------|--|
| Charles McManus       | Phone: +1 (610) 208-1981                                       |
| YUASA, Inc.           | Fax: +1 (610) 372-8613   |
| Post Office Box 14145 | E-Mail: <a href="mailto:cmcmanus@aol.com">cmcmanus@aol.com</a> |
| 2366 Bernville Road   |  |
| Reading, PA 19612 USA |  |



## CONFERENCE ANNOUNCEMENT

Fifteenth Annual

# Applied Power Electronics Conference and Exposition February 6-10, 2000 at the Fairmont Hotel New Orleans, Louisiana USA

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

For additional information, contact:

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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

### APEC 2000 Returns to New Orleans, *from page 1*

drink. You will surely hear "Dixieland" jazz music as you walk down Royal or Bourbon Streets. For \$2 (round trip), take a ride on the St. Charles Avenue trolley; (oldest in the U.S.—dating back to 1835). The trolley takes you through the Garden District where you will see historic homes with elegant gardens and the campus of Tulane and Loyola Universities.

Before providing an overview of the APEC 2000 program, and on behalf of the entire Conference Committee, I wish to express our congratulations to Dr. Thomas M. Jahns, General Chair, APEC '92, for winning the Wm. E. Newell Award. Dr. Jahns, (of the Electrical and Computer Engineering Department, Univ. of WI-Madison), received the Wm. E. Newell Power Electronics Award at the PESC Annual Banquet in Charleston, South Carolina on July 1<sup>st</sup>. The Wm. E. Newell Award is presented to that individual who has demonstrated outstanding achievement in the field of power electronics. Dr. Jahns has also been very active in both PELS and IAS, two of the three sponsors of the APEC

conference. Our best wishes also go out to the entire family, especially his wife and children who support Tom's numerous volunteer activities.

While on the subject of recognition, I wish to express our best wishes to retiring Power Electronics Society (PELS) Newsletter Editor Harry Owen, Jr. for his valuable contributions (in 43 quarterly newsletters) supporting the APEC conference over the past ten years.

On Sunday September 12, 30 members of the conference and program committees met at the Fairmont Hotel in New Orleans to assist Program Chair Mark Nelms and General Chair Bob White with the annual challenge of creating the final Conference Program.

In preparation for this "final cut," 177 volunteers signed up to perform a peer review of the 402 digests received (a new record) for next year's conference. Due to a revision in session size and time limitations of the conference, we are limited to a maximum number of technical papers for inclusion in the program. Only 181,

(representing under 50% of those being considered), will be offered this year.

The 15<sup>th</sup> annual Applied Power Electronics Conference and Exposition (APEC 2000) will be held February 6-10, 2000 at the Fairmont Hotel in New Orleans, LA. The conference is sponsored by the IEEE Power Electronics and Industry Application Society and the Power Sources Manufacturers Association (PSMA). In keeping with the APEC mission to serve the educational needs of practicing professionals in the power electronics industry, the Program Committee has formulated a dynamic program to provide practical information on the latest components and circuits, design oriented analysis techniques, and current trends in the design and manufacture of power electronic products and systems.

A record number of abstracts (402) were received from 41 different nations (another record). It is most encouraging to see the increased number of papers wherein industry and academia are co-authors. To meet the

*Continued on page 7*





**CONFERENCE ANNOUNCEMENT**

**31<sup>st</sup> Annual  
Power Electronics Specialists Conference  
June 18-23, 2000  
Galway, Ireland**

**PESC is one of the major annual conferences of the IEEE Power Electronics Society. It provides a forum for international specialists in power electronics to present and discuss papers on forward-looking topics in this fast-evolving field.**

**For additional information, contact:**

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<http://PESC00.ucg.ie/>**

## **Welcome to PESC 2000**

*Ger Hurley, Conference Chair*

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

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

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

Galway is a thriving city renowned for

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

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## **President's Message** *from page 1*

might help illustrate the benefits and problems of system engineering teams. The Power Electronics Society has always been interested in the context of conversion, particularly in automotive, in telecom, and in utility applications. Your experiences will give us some guidance about establishing new technical committees, or at least will give some good ideas for tutorials at conferences. If you would like to share a story, please send it to me or to the Newsletter Editor.

*by Phil Krein*

## **Power Electronics GOLD**

*James Kokernak*

This year the Power Electronics Society began participating in the IEEE **Graduates of the Last Decade (GOLD)** program. Realizing that maintaining the support of recent graduates is vital for the continued growth of our Society and the Institute as a whole, the PELS is building a GOLD program in concert with IEEE that emphasizes issues concerning PELS members.

The program is in its infancy and could benefit greatly from participation of a few individuals from the various sections. Over the course of the next year, it is anticipated that programs which specifically target PELS GOLD members may be organized to coincide with technical conferences. These activities will offer better value to the recent graduates by providing meetings that discuss issues such as home buying, insurance needs and job hunting. Our goal is to find out how we can better provide the goods and services that recent graduates should expect from the IEEE. For more information on the GOLD program, visit the IEEE website at [www.ieee.org](http://www.ieee.org). For more information on how you can become more active in the Power Electronics Society GOLD Program, send email to [kokerj@ieee.org](mailto:kokerj@ieee.org).



# The 7<sup>th</sup> Workshop on Computers in Power Electronics

## COMPEL 2000



### CALL FOR PAPERS

July 16–18, 2000

Donaldson Brown Hotel and Conference Center · Virginia Tech · Blacksburg, Virginia

The Seventh IEEE Power Electronics Society Workshop on **Computers in Power Electronics (COMPEL 2000)** will focus on areas of electronic computing with regard to design, analysis, control, and operation of power electronic circuits. One focus for COMPEL 2000 will be on “reliable” computer applications in power electronics. After appearing more than three decades ago, the computer has become an essential tool for power electronics engineer. We have all witnessed the exponential improvement in computer performance, but what tangible benefits have been gained? What new control technologies have been enabled? Are simulators of practical value for power electronic circuits? Do device models match experimental results? How about for passive component model? How can we accelerate the process of the system level simulation? The goal of this workshop is to provide a lively venue for discussing these and other issues.

#### Areas of Interests

- Simulation tools
- Numerical methods
- Benchmarking results
- Simulator integration
- DSP applications
- Averaging techniques
- System modeling
- Circuit modeling
- Device modeling
- Thermal modeling
- Parasitic modeling
- Reliability modeling
- Passive component modeling

#### Workshop Format

|                       |                    |
|-----------------------|--------------------|
| Sunday, July 16, PM:  | Technical sessions |
| Monday, July 17, AM:  | Technical sessions |
| Monday, July 17, PM:  | Technical sessions |
| Tuesday, July 18, AM: | Technical sessions |
| Tuesday, July 18, PM: | Computer demos     |

#### Technical Sessions

- Tutorials
- Paper presentations
- Panel discussions
- Poster sessions

#### Social Event

Monday evening dinner party

#### Spouses' Program

- Tour of Natural Bridge
- Tour of Château Morrisette Winery, Blue Ridge Parkway

#### Deadlines

Submission of abstracts and digests:

**February 15, 2000**

Notification of acceptance:

**March 31, 2000**

Manuscripts in final camera ready:

**July 15, 2000**

#### Preparation of Abstracts and Digests

Prospective authors are asked to submit an Abstract and a separate Digest of no more than 5 pages including figures, tables, and references. Both Abstract and Digest should be typed and doubled-spaced on 8 1/2" × 11" or A4 size paper.

The heading of the Abstract should include title of the paper, names and affiliations of all authors, and the corresponding author's mailing address, telephone number, fax number, and email address. The Digest heading should include only the paper title. Electronic submission of the Abstract, Digest, and final Manuscript is highly encouraged, but only in postscript or PDF format. Both Abstract and Digest should be submitted to

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 Blacksburg, Virginia 24061, U. S. A.  
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#### Conference Email and Internet addresses

COMPEL2000@vt.edu  
<http://www.conted.vt.edu/compel.htm>

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**APEC 2000**, from page 4

future challenges of power electronics, it is vital that industry communicates with the academic world as to future requirements which should be considered in school curriculums. Processing and scoring these abstracts, using fewer reviewers, was a difficult task. In reducing the maximum number of papers to seven per technical session, we have included 181 papers that will be presented in 26 sessions arranged into five parallel tracks.

Including papers from 25 Nations, APEC continues to maintain its worldwide recognition as the foremost conference to present technical papers addressing all aspects of applied power electronics. Technical and business abstracts were received from every corner of the globe. Although a large number of papers were received from authors representing Brazil and several Asian countries, we also received papers from as far away as Australia and New Zealand, Saudi Arabia, South Africa and Syria, just to name a few.

APEC 2000 will include 26 technical sessions, 15 outstanding professional education seminars (out of 29 proposals received), 3 audience participation rap sessions, 12 vendor application seminars, the 14<sup>th</sup> annual micromouse competition, and a sold-out Exhibit Hall containing 106 booths.

The Professional Education Seminars

will start on Sunday morning with five parallel tracks that will include in-depth information on: Design and Analysis of Magnetic Devices; Planar Magnetics Technologies; Compact Models of Power Devices and Power IC's for Circuit Simulation; Intellectual Property, Patents and Ethical Issues for Engineers; Telecomm Power System Specifications; State of Power Electronics Packaging; Switching Power Supply Design Basics; Selecting Switchmode Topologies for Various Applications; Latest Developments in Power Factor Correction; Introduction to High Efficiency Electronically Commutated Motor Drives, Switched Reluctance Motor Drives. Recent Advances and State of the Art; Sensorless Control of Induction Motors and Permanent Magnet Synchronous Motors; Introduction to Small-Signal Modeling and Measurement of Switching Converters; Active Feedback Control; and Connecting Theory with Design of Converters in Switchmode Power Supplies, Power Factor Correction Circuits, and Motor Drives.

The Plenary Session will include six outstanding presentations starting with: Automotive Electrical Systems—The Power Electronics Market of the Future; Where are Power Supplies Headed; AC Adjustable-Speed Drives at the Millennium: How Did We Get Here; Implementing the Whole

Product Concept in Strategic Sector Marketing; Optimally Selecting Packaging Technologies and Circuit Partitioning based on Cost and Performance; and Design Issues for 12V/1.5V, 50A Voltage Regulation Modules.

This year's three audience-participation Rap Session topics are as follows:

- Integration of Motor Drives: How Much is Too Much, Dr. Tom Jahns, moderator
- Are Mergers Good for the Power Supply Industry, Don Staffiere, moderator
- 42V Powernet: an Enabling Technology for Automotive Power Electronics, Dr. John Miller, Ford Research and Vehicle Technology, moderator

The Exhibit Hall will contain the latest product offerings from power electronic components to power supplies and DC/DC converters. The conference social events will include a reception with the exhibitors with wine, beer and soft drinks, and hors d'oeuvres Monday evening and light refreshments in the Exhibit Hall on Tuesday evening. The highlight of our social program will be a banquet at Mardi Gras World on Wednesday evening.

For additional conference or exhibition information, please contact APEC 2000 at TEL: +1-202-973-8664, FAX: +1-202-331-0111, or simply click on our web site at [www.apec-conf.org](http://www.apec-conf.org).

See you in New Orleans!!

**Tricks of the Trade**, from page 2

can damp the circuit by knowing the parasitic inductance, since we know the  $Q$  of a damped resonant circuit is:

$$Q = \sqrt{L_p / C_{gate}} / R = Z_o / R$$

We want the fastest response that we can get without overshoot, or critical damping. In this case,  $Z_o = 6.3 \Omega$  and for critical damping we want  $Q = 0.707$  resulting in  $R = 1.4 Z_o = 9 \Omega$ .

If you make the gate resistor too big (say 100  $\Omega$ ) there are 2 effects: (1) you slow down the gate circuit (by overdamping the circuit), and (2) you reduce the amount of current that the gate driver chip can supply to supply MOSFET gate charge. Most chips run from 12V and can supply an amp or more....so this says that 12  $\Omega$  might be an upper value for the damping resistor size.

The problem can actually be worse, if you include effects of the nonlinear input capacitance. For instance, a space-charge capacitance has the capacitance-voltage relationship [2]  $C \propto V^{-1/2}$  and a LC circuit

with such a nonlinear capacitance will have a peak voltage three times the final value. You have to be careful, and make sure you damp the gate circuit intelligently. Fortunately, you don't need to know  $L$  and  $C$  to a high level of accuracy, because all of the important relationships are inside square roots .... This is why a 10  $\Omega$  gate resistor is usually a good starting point.

## REFERENCES:

[1] P. T. Krein, "The Missing Impact of Drain-Source Capacitance," Newsletter of the IEEE PELS, July 1999, pg. 6.

[2] M. F. Schlecht, "Nonlinear Capacitors," course notes, Advanced Power Electronics Seminar, Massachusetts Institute of Technology, 1992.

*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.*

**Chapters News**

Jaime Arau, Chapters Coordinator

At the June AdCom meeting, the annual funding available from PELS to regular chapters was increased from \$500 USD to \$1,000 USD. This funding can be obtained based on a formal request which needs to include also the activities plan for the year. The \$400 USD funding for chapter creation proposals did not change.

The PELS Distinguished Lecturer Program benefits (travel support) was extended to cover also appearances before meetings organized by IEEE Sections.

The concept "Best Chapter Award" was approved. The rules and the official form to participate will be announced in the next newsletter.

In the future our Distinguished Lecturers will be visiting PELS chapters around the world: H. Akagi (Mexico, November),



Continued on page 9



## CALL FOR PAPERS

**World Conference on Industrial Applications of Electrical Energy**  
**An extended IEEE Industry Applications Society Annual Meeting**  
**Sheraton Roma Hotel, Rome, Italy**  
**October 8 - 12, 2000**

**Organized by AEI, IEEE-IAS**  
**Co-sponsored by IEE, IEEJ/IAS, IEEE-PELS**  
**In cooperation with EPE**

**<http://www.aei.it/ias2000.html>**

The Thirty-Fifth **Annual Meeting of the Industry Applications Society** (IAS 2000) will take place Oct. 8-12 in fabulous Roma, the eternal city. The Meeting will take the special form of a World Conference and will address the technical interests related to industrial applications of electrical energy. Papers are solicited on any subject pertaining to the Scope of the Technical Committees of the IEEE Industry Applications Society. Each Technical Session will be tied to a Committee's interest area. Papers will be selected by the Committees sponsoring Technical Sessions at the Annual Meeting according to their scope.

**Abstracts and digests shall be sent directly to the designated Technical Committee Program Chair identified in this call for papers.** Each corresponding author will be notified of acceptance by the Technical Committee and will receive instructions regarding preparation and submission of the final manuscript. Presented papers are eligible for review and publication in the **IEEE Industry Applications Society Transactions**.

Please note that not all IAS Technical Committees have their sessions at the Annual Meeting. If a committee contact is not given in this call for paper, please refer to the appropriate IAS Technical Committee Chair or IAS Technical Department Chair for further information. IAS Technical Department Chairs can be contacted via the Society website: <http://www.ewh.ieee.org/soc/ias/>

### General Abstracts & Digest Requirements

Prospective authors shall submit four copies each of abstract and digest, typed and double spaced on a 8.5" by 11" (A4 size) paper, to the appropriate area of interest Technical Committee Program Chair (one committee only):

- One-page **abstract** of fifty to one hundred words with fully headed paper title, names of all authors, area of interest, and name and address of the correspondent author, including phone, fax, and e-mail.
- **Digest** of up to four pages, including key equations, figures, and tables, headed by the paper title only. The digest must state: purpose of work, manner in which it advances engineering and/or science, and specific results and their significance in sufficient detail for undergoing a review process.

### Authors' Deadlines

November 30, 1999: Abstract and digest due at the Technical Committee Program Chairs.  
 January 31, 2000: Notification to authors of acceptance or rejection.  
 March 31, 2000: Completed camera-ready papers due.

For further information, see <http://www.aei.it/ias2000.html> or contact the Technical Program Coordinator:

Fred Trutt  
 1516 Player Drive  
 Lexington, KY 40511  
 E-mail: [ftrutt@enr.uky.edu](mailto:ftrutt@enr.uky.edu)

## Branding and the IEEE: A Concept Whose Time is Here

By David Kemp, Chair, IEEE Branding Ad Hoc Committee

The IEEE, which we like to point out is "the largest technical professional society in the world," is under siege. Powerful new forces are undermining the organization's future. They include competitive pressures by aggressive and nimble commercial publishers with very deep pockets, continuing high (and costly) IEEE membership turnover, and lack of a cohesive, consistent IEEE image or brand that weakens the IEEE key constituents' ability to understand the overall value of the organization to them.

To gauge the effect of this lack of a consistent and unifying image, the IEEE conducted research during 1998 and 1999 among key IEEE constituent groups - volunteers, other members, students and recent graduates, and influentials in industry, government and academia.

Here are some of the findings:

- The IEEE is not meeting current or evolving member needs well enough. In recent surveys conducted among the IEEE's global membership, more than 75 percent said they personally value their membership, but only 25 percent perceive it to be of value to their employers.
- There is a widespread image void about what the IEEE is - and who it represents, what

it stands for, and where it should be headed. In the same surveys, fewer than half of the members responding said the IEEE is suited to represent information scientists, systems analysts, and software engineers.

- Alternative sources of technical information are a key competitive threat to the IEEE. One-third of the members in the surveys affirm the Internet is becoming a better source of technical information in their fields than the IEEE. In a related survey nearly 63 percent of non-members avow the IEEE is the best source of technical information in their field, but significantly more (86 percent) rely on the Internet.

Does all this disturb you as much as it does me?

Longtime IEEE members who have seen this data are very concerned about it. Since early this year, the Branding Ad Hoc Committee, authorized by the Board of Directors and established by the IEEE President, has been examining IEEE branding issues and is now developing recommendations to provide to the Board in November 1999. With the value of the IEEE name worth literally billions of dollars, the global reach of the organization, and the leadership

reputation for its published content, we believe it is possible to refresh and energize the Institute.

To accomplish this, we need a new, motivating positioning to fill the image void. We need a branding and identity system to support that idea and unify our diverse elements. We must also aggressively market our positioning to our key audiences.

In other words, the IEEE must change - how we operate, communicate, and define ourselves. Change is difficult. It is always more comfortable to stay with the familiar. But our technological world is rapidly transforming itself, with industries converging at ever-faster rates, and new fields emerging with jobs that were unimaginable a decade ago. In the face of all this, the IEEE must step up to managing its brand and leveraging its great value.

The management visionary Peter Drucker said, "Whom the gods would destroy, they first give 40 years of success." In three years, 2003, the IEEE will mark its 40th anniversary.

(For more on the IEEE Branding activities, check this site: <http://www.ieee.org/organizations/committee/branding/index.htm>)

### Chapters News, from page 7

A. Capel (Canada, USA October), P. Maranesi (Spain, TBD), P. Hower (Mexico, October), T. Jahns (USA, October). Visit our web site to know more about the program and receive the benefits.

The Germany IAS-PELS Joint chapter was approved recently and the chair is Prof. Rick De Doncker. CONGRATULATIONS!

I would like to invite all PELS members, and especially those individuals who are currently chairs of PELS chapters, to visit the Chapters section in the PELS Web Site ([www.pels.org](http://www.pels.org)) to review the information prepared about or for you. Give me a hand to keep this information updated.

Jaime Arau  
Chapters Coordinator  
CENIDET  
Cuernavaca, Mexico  
[j.arau@ieee.org](mailto:j.arau@ieee.org)

### PESC 2005 Conference Site Proposals

Tom Habetler, PESC Steering Committee Chair

The PELS PESC Steering Committee is soliciting proposals for the location of PESC 2005. The conference traditionally rotates between North America, Europe, and the Pacific rim. PESC 2005 is slated to be held in North America.

Proposals should be submitted to the PESC Steering Committee Chair prior to April 1, 2000. The proposals should contain information concerning the proposed location and conference advocate/organizers.

Detailed information should be included concerning the proposed conference facility. This includes number, size and cost of meeting rooms, and a description and approximate cost of lodging rooms. Other information concerning the local area and

travel is also useful.

The proposals will be discussed and reviewed at the Steering Committee meeting to be held at PESC 2000. Each site advocate will have an opportunity to summarize their proposal to the committee. Closed discussions will then be held concerning the proposals, and any open issues will be addressed. The final selection will be done by balloting the committee. Conference advocates will be informed of the results of the ballot by October 2000.

Tom Habetler  
PESC Steering Committee Chair  
Georgia Tech, School of ECE  
Atlanta, GA 30332, USA  
Fax: 404-894-4641  
[thabetler@ee.gatech.edu](mailto:thabetler@ee.gatech.edu)

**CALL FOR PAPERS -- IEEE International Power Electronics Congress (CIEP 2000)  
October 15-19, 2000, Acapulco, Mexico**

**Deadline for Abstract & Digest: January 10, 2000**

**For further information, see <http://www.cenidet.edu.mx/ciep2000/>**

## Nominations Sought for Society Awards, *from page 1*

the top three candidates from the first ballot. Both ballots are tallied using an arithmetically averaged process with priority weighting.

The William E. Newell Power Electronics Award is given for outstanding career achievement in power electronics. It is dedicated to the memory of Dr. William E. Newell of the Westinghouse Research and Development Center in Pittsburgh, Pennsylvania USA. The recipient is judged to have made outstanding contributions to the multidisciplinary field of power electronics that crosses the technical boundaries of a number of societies of the IEEE. The award consists of an inscribed plaque and a cash award of \$1,750. Over a span of more than two decades, this award has come to represent the recipient's crowning achievement as a contributor to the field of power electronics. The Nominating Committee for this award is the PELS Awards Committee. The Selection Committee comprises the past winners of the award.

The Power Electronics Society Distinguished Service Award is presented to a member of the Society in recognition of exceptional dedication and service to the Power Electronics Society over a substantial period. This award consists of an inscribed plaque and a cash award of \$1,200. The Nominating Committee for this award consists of all elected and ad hoc members of the PELS Administrative Committee. The PELS Awards Committee serves as the Selection Committee.

The Richard M. Bass Outstanding Young Power Electronics Award is given for outstanding achievement in the field of power electronics by an IEEE member of any grade who is less than 35 years of age on January 1, 2000. The recipient is judged to have made an outstanding contribution to the field of power electronics. This award consists of an inscribed plaque, a cash award of \$500, and reasonable reimbursement for transportation expenses up to \$500 to attend the Annual PELS Awards Banquet. This banquet is typically held during the Power

Electronics Specialists Conference. The Nominating Committee consists of the Chair of this Awards Subcommittee and six individuals appointed by this Chair. The Selection Committee comprises six past recipients of the Newell Award appointed by this Chair.

Although each of these three awards has a Nominating Committee, every member of PELS has the opportunity, and is encouraged, to nominate candidates for these awards. You may use the forms on pages 10 and 11 of this Newsletter, attaching a separate sheet summarizing the nominee's qualifications and achievements. Alternatively, you may request nomination forms and a sheet giving the details of the selection criteria and the nomination and selection procedures from the Awards Committee Chair.

At the Awards Banquet, the Society will also present 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 1999.

### IEEE POWER ELECTRONICS SOCIETY

#### NOMINATION FORM

#### The William E. Newell Power Electronics Award

Award Year 2000

All parts of the form must be completed and received by January 15, 2000

Nominated by \_\_\_\_\_ Nominator's IEEE Member Number \_\_\_\_\_

Nominee's Name \_\_\_\_\_ Nominee's Business Telephone \_\_\_\_\_

Nominee's Business Address \_\_\_\_\_

Nominee's Educational Background \_\_\_\_\_

On a separate sheet, in no more than 600 words including any attachments, summarize the Nominee's qualifications and contributions to the field of power electronics. Since all members of the Selection Committee may not know the Nominee, please describe his/her most pertinent achievements and provide specific examples of outstanding accomplishments. For example, with respect to patents and papers published, their particular significance and value should be pointed out.

This award is to recognize outstanding career achievement in power electronics, a multidisciplinary field that crosses the technical boundaries of a number of IEEE Societies. The award consists of a suitably inscribed plaque and a cash award of \$1,750 presented at the PELS Awards Banquet customarily held at the annual Power Electronics Specialists Conference. All practitioners in the field of power electronics are eligible. Achievements by which an individual is judged to have made outstanding contributions encompass a broad range of activities and include teaching, innovative research, consulting endeavors, professional seminars, major project or program management, and the general communication and advocacy of power electronics technology to the technical community as a whole. The technical disciplines which encompass the field of power electronics include the analysis, design, development, simulation and application of electronic devices, magnetics, controls and power circuits for inverters, converters and motor drives ranging in power level from fractions of a watt to megawatts.

***The nomination form and accompanying sheet summarizing the nominee's qualifications and contributions should be sent to C. O. Riddleberger, PELS Awards Chair, 497 Old Mine Brook Road, Far Hills, NJ 07931-2550 USA; FAX: +1-908-221-1014***

**IEEE POWER ELECTRONICS SOCIETY****NOMINATION FORM****Richard M. Bass Outstanding Young Power Electronics Engineer Award  
Award Year 2000**All parts of the form must be completed and received by January 15, 2000

Nominated by \_\_\_\_\_ Nominator's IEEE Member Number \_\_\_\_\_

Nominee's Name \_\_\_\_\_ Nominee's Date of Birth \_\_\_\_\_

Nominee's Business Address and Telephone \_\_\_\_\_

Nominee's Educational Background \_\_\_\_\_

On a separate sheet, in no more than 600 words including any attachments, summarize the Nominee's qualifications and contributions to the field of power electronics. Since all members of the Selection Committee may not know the Nominee, please describe his/her most pertinent achievements and provide specific examples of outstanding accomplishments. For example, with respect to patents and papers published, their particular significance and value should be pointed out.

This award is to recognize outstanding career achievement in power electronics by an engineer of less than 35 years of age. The prize consists of a cash award of \$500, a certificate, and reimbursement for transportation expenses up to \$500 to attend the annual PELS Awards Banquet. All IEEE members of any grade, active in the field of power electronics and less than 35 years of age as of January 1 of the year of the award, are eligible. The basis for judging candidates for the award includes outstanding contributions in the multidisciplinary field of power electronics. Outstanding contributions encompass a broad range of activities, including research, innovative product design, teaching and project management. The technical disciplines which encompass the field of power electronics include the analysis, design, development, simulation and application of electronic devices, magnetics, controls and power circuits for inverters, converters and motor drives ranging in power level from fractions of a watt to megawatts.

***The nomination form and accompanying sheet summarizing the nominee's qualifications and contributions should be sent to C. O. Riddleberger, PELS Awards Chair, 497 Old Mine Brook Road, Far Hills, NJ 07931-2550 USA; FAX: +1-908-221-1014***

**IEEE POWER ELECTRONICS SOCIETY****NOMINATION FORM****Distinguished Service Award  
Award Year 2000**All parts of the form must be completed and received by January 15, 2000

Nominated by \_\_\_\_\_ Nominator's IEEE Member Number \_\_\_\_\_

Nominee's Name \_\_\_\_\_ Nominee's Business Telephone \_\_\_\_\_

Nominee's Business Address \_\_\_\_\_

Nominee's Educational Background \_\_\_\_\_

On a separate sheet, in no more than 600 words including any attachments, summarize the Nominee's qualifications and contributions to the field of power electronics. Since all members of the Selection Committee may not know the Nominee, please describe his/her most pertinent achievements of leadership and accomplishments in introducing successful new programs, nurturing growth of individual Society members, and enhancing the reputation and stature of the Society. Provide specific examples of outstanding contributions and point out their particular significance.

This award is to recognize long and distinguished service to the welfare of the Power Electronics Society at an exceptional level of dedication and achievement. The prize consists of a cash award of \$1,200 and an engraved plaque to be presented at the PELS Award Banquet customarily held at the annual Power Electronics Specialists Conference. All members of the Power Electronics Society are eligible. The basis for judging candidates for the award includes outstanding contributions over a substantial time period encompassing creative and invigorating leadership of the Society, exceptional administrative and managerial accomplishments on behalf of the Society, identification of new technologies within the scope of the Society and nurturing activities to support these emerging technologies, initiation of innovative programs to encourage wider participation in the full spectrum of Society activities, and the general communication and advocacy of power electronics technology to the technical community as a whole.

***The nomination form and accompanying sheet summarizing the nominee's qualifications and contributions should be sent to C. O. Riddleberger, PELS Awards Chair, 497 Old Mine Brook Road, Far Hills, NJ 07931-2550 USA; FAX: +1-908-221-1014***

## Meetings of Interest to PELS Members

**APEC® 2000, 15th 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 Fairmont Hotel, New Orleans, Louisiana, USA, February 6-10, 2000. See pages 1 and 4 of this *Newsletter* for details.

**SSMSD'2000, the 2000 Southwest Symposium on Mixed-Signal Design**, will be held February 28-29, 2000 in San Diego, California. It is sponsored by the University of Arizona Mixed-Signal Design Consortium, in cooperation with the IEEE. See <http://www.ece.arizona.edu/conferences/ssmsd/> for further information.

**PESC® 2000, 31st Annual IEEE Power Electronics Specialists Conference**, will be held June 18-23, 2000 at the National University of Ireland, Galway, Ireland. PESC 2000 is sponsored by the IEEE Power Electronics Society. See page 5 of this *Newsletter* for additional information.

**COMPEL 2000, the 7th IEEE Workshop on Computers in Power Electronics**, is scheduled for July 16-18 at Virginia Tech in Blacksburg, Virginia. It is sponsored by the IEEE PELS. See page 6 of this *Newsletter* for more details.

**INTELEC® 2000, the 22nd International Telecommunications Energy Conference**, is set for September 10-14, 2000 at the Hyatt Regency, Phoenix, Arizona. See page 3 of this *Newsletter* for additional information.

**IAS 2000, the 35th Annual Meeting of the IEEE Industry Applications Society**, will be held in Rome, Italy, October 8-12, 2000. This world conference is organized by AEI and IEEE/IAS, and co-sponsored by IEE, IEEE/IAS, and IEEE/PELS, in cooperation with EPE. See page 8 of this *Newsletter* for more details.

**CIEP 2000, the 7th IEEE International Power Electronics Congress**, will be held October 15-19, 2000 in Acapulco, Mexico. Abstracts and digests are due January 10, 2000. For additional information visit <http://www.cenidet.edu.mx/ciep2000/>.

**ISIE 2000, the IEEE International Symposium on Industrial Electronics**, will take place December 4-8, 2000 in Puebla, Mexico. Sponsored by the IEEE Industrial Electronics Society and the Universidad de las Americas-Puebla, Electronics Department. Abstracts are due February 15, 2000. For further information see <http://www.udlap.mx/~centia/isie2000/> or contact Alfredo Nava-Sugura at [alnavas@mail.udlap.mx](mailto:alnavas@mail.udlap.mx).

**2000 IEEE Power Engineering Society Winter Meeting** will be held January 23 - 27, 2000 in Singapore. For further information email PES Winter 2000 Secretariat at [ctmapl@singnet.com.sg](mailto:ctmapl@singnet.com.sg)

**POWERCON 2000 International Conference on Power System Technology**, is set for December 4-7, 2000 in Perth, Western Australia. Organized by IEEE Power Engineering Society, Western Australia Chapter. See <http://www.ee.uwa.edu.au/~aips/powercon/> for further information.

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