

President's Message

My sincerest wishes to all of you for a joyful and prosperous new year!! As PELS President, 2001 was an exciting and enjoyable time for me. I was fortunate to attend the three major PELS conferences, PESC, APEC, and INTELEC. Each of them does an outstanding job of serving our membership in their own unique way. Our conferences have evolved into multifaceted meetings wherein attendees are not only able to



attend technical paper sessions and tutorials, but can also view industrial exhibits, network and attend social functions, visit local industries, and participate in organizational and technical committee meetings. I had the pleasure of attending INTELEC this year for the first time. PELS can take great pride in this exemplary event in telecom energy systems. It has a first-rate exhibition, a dynamic organizing committee, and a high level of industry support and participation. If you are among the roughly half of our members that occasionally or never attend a conference, I strongly encourage you to check one out and take advantage of the benefits.

Thanks to the hard work of editor-in-chief, Art Kelley, the Transactions has moved to completely electronic review and correspondence, while maintaining its very high quality level. Our system for handling and reviewing papers is now as good as any in the IEEE. Our website has also been recently overhauled under the direction of our webmaster, Phil Krein. Of particular note, we now have a "PELS Answers" group. Anyone can send a question in the general area of power electronics to answers@pels.org, and this team of volunteers will try to provide the information you need. Any suggestions on further improvements to our website and its services are appreciated.

PELS has taken several strides to improve educational services and opportunities for our members during the past year. As you are probably aware from past articles in this publication, the "Future Energy Challenge" completed its inaugural competition in October. This student event is a great

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PELS Members Named as IEEE Fellows

The IEEE Fellow Committee has named 259 IEEE Senior Members to Fellow Grade effective 1 January 2002. The membership grade of Fellow is conferred each year on not more than one-tenth percent of the total IEEE membership to recognize distinction in the field of electrical and electronic engineering.

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APEC® Returns to Dallas

The Applied Power Electronics Conference (APEC) will be returning to the Adams Mark Hotel in Dallas, TX. The conference starts Sunday, March 10, with professional education seminars and concludes Thursday, March 14.

APEC is like a family. For sixteen consecutive years in good times and bad, we have participated in APEC. We come together once each year with a single goal—to share our research, experience and knowledge of "applied power electronics." This year authors from 25 countries will present papers at APEC, and forty-five percent (45%) of these papers are from colleagues outside the USA, confirming that APEC is an international Conference.



We were undaunted by "Desert Storm" in 1991, and "El Nino" in 1998, and we will not let the tragic events of September 11 hamper our determination, once again, to put on a world-class program.

Being selected to present a technical paper or a Professional Education Seminar at APEC is not easy, as only 50% of all submissions are accepted for the Conference. The good news is that APEC has a long list of capable experts who can offer the highest caliber of applied power electronics education for every attendee.

Over 180 papers will be presented in 26 technical sessions commencing Monday afternoon. Sessions for APEC 2002 will include papers on dc/dc converters, manufacturing, marketing, motor drives, EMI, PFC, VRM's, lamp ballast's, utility interface, UPS, modeling and simulation to rec-

Continued on page 9

Australia to Host PESC®

The 2002 Power Electronics Specialists Conference (PESC) will be held June 23 — 27, 2002, in Cairns, in tropical far north Queensland, Australia. As stated in [1], "Cairns is the tourist 'capital' of the Far North and one of Australia's top travellers' destinations. From Cairns, you can arrange trips to the Great Barrier Reef, Green Island and Fitzroy Island, the beautiful Atherton Tableland, the market town of Kuranda, the string of enchanting beaches stretching 50km (30mi) north to Port Douglas, and the spectacular rainforest and coastal scenery of Cape Tribulation and the Daintree River."

Just over a year ago I visited Cairns and worked with Grahame Holmes, Program Chair, his wife Sophie who has lots of experience and enthusiasm, and their two children who proved to be excellent connoisseurs of all things to do with tourism, hotels, attractions etc. They were there on holiday, but we worked very solidly for nearly 24 hours, digging under the surface. I hadn't been to Cairns since 1993 when I attended the Australian National Engineering conference. That was when I decided that Cairns was an excellent place for a conference, and when

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Become an IEEE Senior Member

The Power Electronics Society is conducting a Senior Member drive to nominate new IEEE Senior Members from our Society. Some of the benefits of Senior Membership are:

- The professional recognition of your peers for technical and professional excellence.
- An attractive fine wood and bronze engraved Senior Member plaque to proudly display.
- Up to \$25 gift certificate toward one new Society membership.
- A letter of commendation to your employer on the achievement of Senior Mem-

ber grade (upon the request of the newly elected Senior Member.)

- Eligibility to hold executive IEEE volunteer positions.

The requirements for Senior Membership are:

- Ten years of professional practice (a BS counts as three years, an MS as four years and a PhD as five years).
 - Five years of significant performance.
- Many prospective applicants make the mistake of assuming that "significant performance" requires special awards, patents or other extremely sophisticated technical accomplishments; such is not the case. Significant performance is also indicated by substantial job responsibilities, such as being team leader, task supervisor, engineer in charge of a program or project, engineer or scientist performing research with some measure of success (papers), or faculty developing and teaching courses with research and publications.



The application process is straightforward: just fill out an application form (it can be done online). You will need three references, who must be Senior Members. The advantage of being sponsored by PELS is that only two references are then needed. Moreover, we can help you find additional references!

For some general information on Senior Members go to <http://www.ieee.org/organizations/rab/md/smprogram.html>

Anyone interested in being sponsored by PELS should not hesitate to contact me. I will send you detailed instructions on how to apply.

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Quicker News Delivery

The *Power Electronics Society Newsletter* is available on the internet in PDF format approximately three weeks 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. Additionally, the email notification sometimes includes timely announcements that are not in the printed newsletter.

Awards Nominations Due

Nominations for the Power Electronics Society's three major awards for 2002 are due now. The William E. Newell Power Electronics Award, the Richard M. Bass Outstanding Young Power Electronics Engineer Award, and the Distinguished Service Award recognize outstanding contributions to the field of power electronics or to the Society. These three awards, the Prize Chapter Award and the PELS Transactions Prize Paper Awards will be presented at the awards banquet at PESC 2002 in Cairns, Queensland, Australia in June 2002.

PELS members are urged to nominate worthy candidates to supplement the recommendations of the nominating committees for the awards. The nominator plays a crucial role in the activities leading to the selection of a recipient, and can take pleasure second only to that of the winner when the award is announced.

Make your nomination today, and send it by e-mail or fax to the PELS Awards Chair. Nomination forms were printed in the October 2001 issue of this Newsletter. The forms are also available for downloading at the PELS web site www.ieee.org.

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2003 Future Energy Challenge

The 2003 Future Energy Challenge is being sponsored by the U.S. Department of Energy, three IEEE societies, and a number of others. The theme is "Energy Challenge In The Home." Award money will be made available for specific topics, such as low-cost inverters for home alternative energy, high-efficiency appliances, motor advances for deep loss reduction, and other topics. The competition is open to student engineering teams around the world. Information will be available on the web site, <http://www.energychallenge.org>.

We are pleased to announce the Organizing Committee leaders for the 2003 Challenge: Chair, Prof. Jo Howze, Texas A&M. Vice-Chair, Prof. Fang Peng, Michigan State University. If you wish to be on the mailing list or would like to be involved as a volunteer, sponsor, or participant, you may contact the Society Administrator, Bob Myers, bob.myers@ieee.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. 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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Australia to Host PESC[®] *from pg 1*

I first met Intermedia, who ran that conference. I am delighted to report that this large town / small city has gained in sophistication, but has not lost its energy and vibrancy. Its facilities have dramatically increased, and the palpable sense of a relaxed, casual, friendly, tropical, small-town environment was exactly as I had remembered it.

The Conference will be in a new high-tech convention center [2], of which we will use only a fraction, but we will be very comfortable and strongly supported by very good staff.

By now there should be a range of recommendations for accommodations on our web site [3], all the way down to back-packers for students. The five-star hotel [4] is about 150 meters from the convention center and is exactly as you would expect. About another 100 meters further there is a locally-owned, four-star hotel [5], with which we were very impressed. They have a range of good economical restaurants for quick lunches, and displayed a real commitment to quality. They have a highly committed staff, fiercely proud of the fact that they were NOT part of a chain. A lot of care and thought has gone into helping people who are touring and want to control their expenditure so that they can splurge elsewhere. Many more possibilities are nearby, such as a range of apartments for sharing, or for families. Peter Wolfs, in charge of our audio-visual arrangements, visited Cairns recently and reports very favorably on a nearby apartment complex [6], one and two bedroom apartments, about 18 months old, very reasonably priced.

The jewel for anyone who likes absolute isolation right on tropical white sandy beaches might be to stay in tiny, specialized beach resort areas up to 25 km up the coast [7]. You'd need to pick up a car at the airport, the 25 km drive on mainly rural roads takes about 25 minutes, and you can park curbside at the convention center for free! Might sound a bit indulgent but if the exchange rate stays roughly where it is (\$1 AUD = \$0.52 US in January), why not?

The social program is shaping up well, and is expanding by the minute. We are working to get some Australian "flavor" into the Sunday evening welcoming reception. Many of us enjoyed the short brass concert at PESC in Vancouver. It was challenging to provide a similar experience in Cairns, since the musicians live long distances away in the main population centers of Australia.

Fortunately, two professional musicians, Vicente Salas and Manuel Gordillo, will be attending PESC in Cairns and have agreed to provide us with about an hour of piano and flute music on Monday evening, which we will follow with refreshments.

Sophie is looking at the day tours for accompanying persons and the offerings are vast. The surrounding World Heritage Tropical Rainforests are within a few kilometers of Cairns. The coastal strip supports intensive sugar cane farming. Only a couple kilometers or so from the sea the land rises steeply 350 meters to tablelands with more traditional Australian agriculture. An old restored train makes the daily run, zigzagging through the rain forest and lots of tunnels up the escarpment to the tablelands. Sophie also plans to exhibit art featuring local artists, much of whose work concentrates on local themes, in the expansive foyer of the convention center. On the outskirts of town is Tjapukai, a remarkable center where you can learn about aboriginal culture, see shows with actors mixed in with 3D laser imaging, see traditional dancing, enjoy Australia Bush Tucker, and so on [8].

We are working with Intermedia, professional conference organizers based in Brisbane, the capital of Queensland, to ensure a very high level of professional attention at all levels of the conference organization. As is usual with PESC, much will be done by enthusiastic volunteers within the IEEE. However the geographic distance between Australian committee members led us to believe that we should work alongside onsite professionals to be really sure about the quality of all aspects of the conference.

Since I am currently at the University of South Carolina with Jerry Hudgins, I enlisted a long-time friend Gerard Ledwich, Queensland University of Technology, as Deputy General Chair to make sure that things were always in order. We are also supported by Geoff Walker, a very keen young academic at the University of Queensland in Brisbane, who is the active liaison between our committee and Intermedia.

The conference ends on Thursday evening. And then Friday?

One of the most memorable days of my life, about 10 years ago, was to take a full-day tour of one of the natural wonders of the world—the outer Great Barrier Reef [9]. Huge aluminum twin-hulled wave-piercing catamarans carry 250 passengers up the coast 60 km to Port Douglas, then head out

to sea about 80 km at very high speed to a huge moored viewing platform on the outer reef, where coral is only a couple feet below the surface. You can swim, snorkel, scuba dive, or if you don't want to get wet, there are underwater viewing rooms, glass-bottomed boats and mini "submarines." A buffet luncheon on board the big cat, then back to the coral and the fish. Late afternoon they roar you back to Cairns. As I remember I slept most of the way back.

Then you see the rest of Australia.

Then you go home.

References:

- [1] <http://www.lonelyplanet.com/destinations/australia/attractions.htm>
- [2] <http://www.cairnsconvention.com.au>
- [3] <http://www.pesc02.com/>
- [4] <http://www.cairnsinternational.com.au/>
- [5] <http://www.pacifichotel Cairns.com/>
- [6] <http://www.outrigger.com/details/property.asp?code=acr>
- [7] <http://www.cairnsconventionbureau.com/> click on "visitors guide", then "Cairns beaches"
- [8] <http://www.tjapukai.com.au/>
- [9] <http://www.quicksilver-cruises.com/>

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President's Message *from page 1*

mechanism for promoting power electronics and energy systems. I would like to personally congratulate the entire organizing team for their efforts. Plans for the next event are well underway. Other new educational products include tutorials available on-line and on CD, with more on the way.

PELS membership continues to grow at a rate that outpaces the IEEE as a whole. We are continuously adding new chapters, many of which are joint with other societies. Our level of cooperation with our sister societies has never been higher. We continue to add regional conferences around the world to the list of events that we support. I look forward to many more exciting opportunities and undertakings for PELS in the coming year. As always, we need volunteers like you to make PELS a better organization for all of us.

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present

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Tricks of the Trade: Poincare Stability Analysis of Switching Converters with Nonlinear Control[®]

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From the slightly nonlinear buck to the seriously nonlinear buckboost, switching converters are nonlinear in nature. The best performance of a nonlinear system often comes from nonlinear control. This article presents a trick for studying the stability of switching converters with nonlinear control using Poincare maps [1,2].



Figure 1 illustrates the concept of the Poincare map. Behavior of state variables (inductor currents and capacitor voltages) is plotted, and in this case the motion converges to the closed orbit γ . We can choose a local cross section Σ so that the state motion always transverses Σ . The states are sampled every time the motion crosses Σ . The samples give rise to a new discrete-event system, called a *Poincare map*, that describes the dynamics from crossing to crossing. For most power converters, the Poincare map is easier to analyze than the original system. Also, the stability of the behavior in Σ reflects the stability of the overall system.

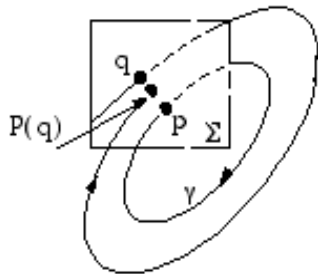


Fig. 1. Poincare map development

Let's use a buck converter with current-mode control (Fig. 2) as an example to explain the mapping method. In the circuit, the clock turns on the active switch at the beginning of the switching cycle. The rising inductor current is compared to a current reference with a compensation ramp. When the comparator changes state, it resets the flip/flop and turns off the switch.

Fig. 3 shows the time behavior. The solid line i_L^* represents the steady state inductor current and the dashed line i_L represents a transient condition. The analysis is well-known [3]. The inductor current has a rising slope $M_1 = (V_g - V_o)/L$ and

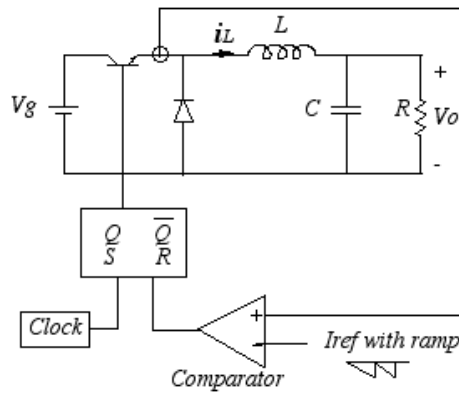


Fig. 2. Buck converter with current-mode control

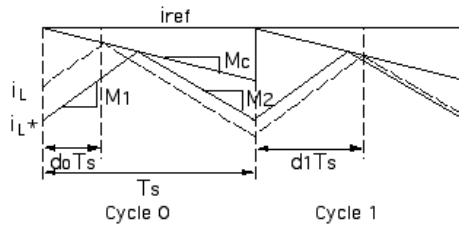


Fig. 3. Inductor current waveforms

falling slope $M_2 = V_o/L$. The compensation ramp has a slope of M_c . By equating the distance from the current reference i_{ref} to the valley of the inductor current at the end of the 0th cycle and the beginning of the first cycle, we get

$$M_2(1 - d_0)T_s + M_c d_0 T_s = (M_1 + M_c) d_1 T_s \tag{1}$$

This can be rearranged to map the duty ratio from the 0th cycle to the first cycle:

$$d_1 = \frac{M_2}{M_c + M_1} + \frac{M_c - M_2}{M_c + M_1} d_0 \tag{2}$$

Similarly, we can map the duty ratio from the nth cycle to (n+1)th cycle. In general, a Poincare map can be expressed as $d_{n+1} = f(d_n)$. The equilibrium point of the duty ratio d^* can be derived when $f(d^*) = d^*$,

$$d^* = \frac{M_2}{M_1 + M_2} = \frac{V_o}{V_g} \tag{3}$$

Now, for convenience, let

$$\mu = \frac{d}{dd} f(d) = \frac{M_c - M_2}{M_c + M_1} \tag{4}$$

The transient $f(d)$ from d_0, d_1, \dots to d_n can be written as

$$d_n = (1 - \mu^n) d^* + \mu^n d_0 \tag{5}$$

The stability condition for the Poincare map is $|\mu| < 1$. For the special case of $\mu = 0$, i.e. $M_c = M_2$, the transient recovers in a single cycle (a dead-beat behavior). The Poincare map for this one-cycle response is shown in Fig. 4. When $|\mu| < 1$, the transient will

converge to the steady state after several cycles. Fig. 5 illustrates an oscillatory convergence of the transient for $-1 < \mu < 0$, while Fig. 6 shows a monotonically decaying transient for $0 < \mu < 1$. The case $\mu \geq 1$ requires a flat or rising off-state inductor current, which will not occur with a load that consumes energy.

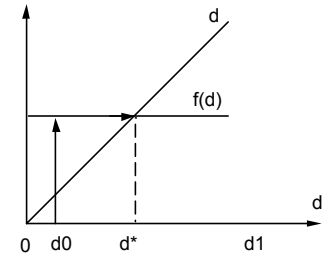


Fig. 4. $\mu = 0$, one-cycle map

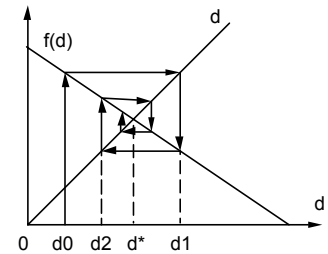


Fig. 5. $-1 < \mu < 0$, oscillatory decaying map

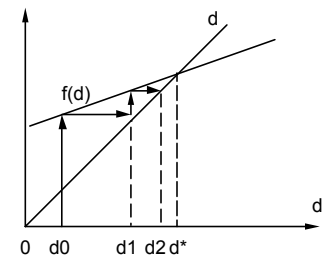


Fig. 6. $0 < \mu < 1$, monotonically decaying map

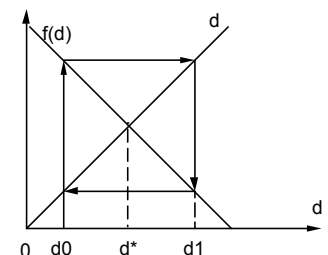


Fig. 7. $\mu = -1$, two-period map

When $\mu = -1$, as shown in Fig. 7, a two-period subharmonic oscillation arises. The initial duty ratio d_0 is mapped to $d_1 = f(d_0)$ in

Continued on page 6

INTELEC '01 Recap

The 2001 International Telecommunications Energy Conference (INTELEC) took place October 14 – 18, 2001 at the Edinburgh International Conference Centre. Representatives from over 35 countries took part, with over 1100 people attending the event, and from the feedback received the Conference was viewed as a complete success.

Three interesting and varied tutorials were held Sunday afternoon, and the Exhibition area was formally opened that evening by Mr John Parsons, the Chairman of INTELEC 2001. John's introductory speech majored on the importance of the Conference and welcomed everyone to Edinburgh. With over 75 exhibition stands there were plenty of new technical products on view and exhibitors on hand to discuss their wares. Battery manufacturers were much in evidence as well as remote monitoring systems and software support systems. For the first time in several years, some Air Handling unit manufacturers were

at the Conference showing their products, as well as Standby Engine manufacturers explaining the importance of reliable reserve power supplies.

The two opening guest speakers, Dr Paul Reynolds (CEO of BT Wholesale) and Dr Peter Radley (Chairman of Alcatel UK), set the scene for the Conference on Monday morning by explaining the importance of communications in the 21st century. Factors such as the economic status of the world and the importance of power were highlighted. This was a slightly different approach than at previous conferences, where the plenary session normally covers technical issues. The theme of both presentations was that significant changes are taking place in the telecommunications industry, particularly with the advent of 3G and other high heat dissipating products. The energy costs are set to increase between 4% and 7% in the coming years, placing additional costs on the operators and additional burdens on cooling equipment design.

Throughout the following 4 days, over

90 technical papers were delivered and while battery problems continued to be a major theme of the conference, there were some very interesting presentations on users' experience of installing reliable power supplies in remote locations.

One common theme through many of the papers was the need for high reliability and the cost of failure. Costs of loss of revenue ranged from £8k per minute for a small exchange to approaching £700k for Data Centres. There was also increased attention paid to various forms of fuel cells. While in many cases their costs were higher than conventional standby systems, there was felt to be a market for them in certain applications.

In a situation where conferences are being cancelled as a result of the ongoing impact of the World Trade Center disaster and the downturn in the world's economy, the attendance of over 1100 people indicates how important this Conference is to many people around the world.

INTELEC 2002 will be held in Montreal, September 29 – October 3, 2002.

Tricks of the Trade from page 5

the first cycle, then d_1 is mapped back to d_0 in the next cycle and the pattern will repeat forever. When $\mu < -1$, shown in Fig. 8, the map no longer converges. For any initial duty ratio d_0 that is not equal to d^* , the subsequent duty ratios diverge to chaos, and the duty ratio is unstable. If d^* is reached somehow, noise will perturb the duty ratio enough to continue the chaotic behavior.

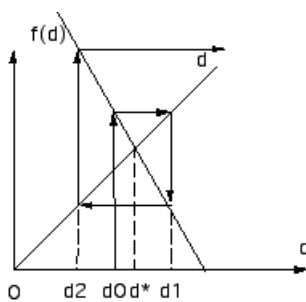


Fig. 8. $\mu < -1$, chaotic map

In most applications, we would want to have $-1 < \mu < 0$ or $0 < \mu < 1$. Fig. 9 shows the duty ratio for the first 20 cycles with $\mu = 0.8$ and $\mu = -0.8$. In Fig. 10, the number of cycles required for the transient to decay to 36% (analogous to a time constant) or to 5% are shown. One may use the former curve to estimate the time constant of a current-mode control loop.

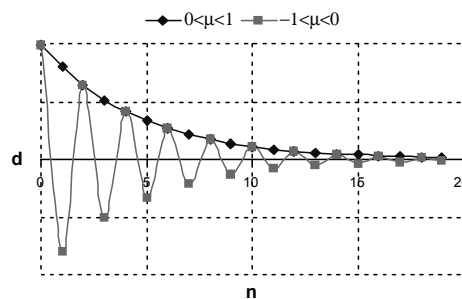


Fig. 9. Duty ratio value in n th cycle when $\mu = 0.8$ and $\mu = -0.8$

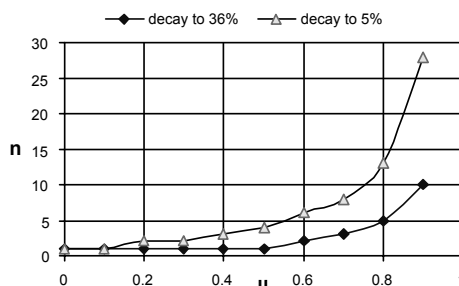


Fig. 10. Number of cycles for the transient to decay to 36% or to 5% for $|\mu| < 1$

The Poincaré map is an effective tool for nonlinear analysis of switching converters with cycle-by-cycle nonlinear control; e.g., [4]. By establishing the Poincaré map from waveforms that determine duty ratio, the stability condition and convergence speed can be evaluated.

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- [1] J. Guckenheimer and P. Holmes, *Nonlinear Oscillations, Dynamical Systems, and Bifurcations of Vector Fields*. New York: Springer-Verlag, 1986.
- [2] S. Banerjee, G. C. Verghese, eds., *Nonlinear Phenomena in Power Electronics*. New York: IEEE Press, 2001.
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- [4] K. Smedley, L. Zhou, and C. Qiao, "Unified constant-frequency integration control of single phase active power filter," *IEEE Trans. Power Electronics*, vol.16, (no.3), pp. 428-436, May 2001.

Editor's note: The new book [2] from IEEE Press presents a broad range of topics, methods, and controls, and also has more detail for all types of power converters.

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.

Chapter News

I would like to begin this year by sharing good news with you about two recently created chapters. One is a PELS/PES/IAS joint chapter at Campina Grande (Bahia Section) in Brazil, which was organized by Prof. Edison Cabral da Silva. The other is a



PELS student chapter at CENIDET, Mexico (Morelos Section), and was organized by Ciro Nufez. A complete list of current PELS regular, joint, and student chapters can be found at

<http://www.pels.org/Comm/Chapters/chapters.html>. I would like to express my deepest wishes for the success of these new chapters.

I would also like to encourage all chapters to apply (see form on page 10) for the 2001 Best Chapter Award. PELS provides this award, consisting of a \$1,500 USD cash prize and a certificate, to recognize technical activities developed during 2001.

I have observed that many chapters have excellent, high-level technical activities in their local or regional zone of influence. Those kind of activities can give chapters a good chance of winning this important award.

Jaime Arau
Chapters Coordinator
CENIDET
Cuernavaca, Mexico
jarau@ieee.org

IEEE Fellows

from page 1

Recognition of new Fellows is the culmination of a rigorous evaluation process that begins almost a year in advance. The process begins with the nominator, who is responsible for preparing the Fellow Grade Nomination Form, soliciting references from five to eight Fellows capable of assessing the candidate's contributions, and identifying the IEEE Society/Council whose evaluating committee will assess the candidate's technical qualifications and contributions. Next the Fellow Committee, comprised of 25 members plus a chair, has the task of recommending candidates in late fall to the Board of Directors. The Board acts upon those recommendations at its year-end meeting.

During 2001 the Fellow Evaluation Committee of PELS evaluated a record number of Fellow candidates. It is a pleasure to congratulate the new 2002 IEEE Fellows. Following is an alphabetical list of the six new Fellows who are members of the Power Electronics Society:

- Thomas G. Habetler, Georgia Institute of Technology, Atlanta, GA; for contributions to electric motor control and condition monitoring.
- Allen R. Hefner, National Institute of Standards and Technology, Gaithersburg, MD; for contributions to the theory and modeling of power semiconductor devices.
- John R. Holmquist, Weyerhaeuser En-

gineering Services, Tacoma, WA; for the implementation of advanced electrical technologies in the pulp and paper industry.

- Praveen K. Jain, Queen's University, Kingston, ON Canada; for contributions to efficient high-frequency power converter systems.
- Atsuo Kawamura, Yokohama National University, Yokohama, Japan; for contributions to real-time digital feedback control of PWM inverters and its application to UPS.
- Toshiaki Yachi, NTT Telecommunication Energy Laboratories, Tokyo, Japan; for contributions to power semiconductor and micro-magnetic devices.

Since the deadline for nominating candidates for IEEE Fellow is March 15, nominators are encouraged to begin as soon as possible. Members of the Fellow Evaluation Committee cannot be involved in nominating a candidate nor in supporting his nomination. For 2002 the members of the PELS Fellow Evaluation Committee are: H. Akagi, D.M. Divan, P.L. Hower, P.T. Krein, M.P. Kazmierkowski, W.E. Sayle, R.L. Steigerwald, J. D. van Wyk, and K. Yotsumoto. The complete list of new fellows, along with details of the nomination process, can be found at <http://www.ieee.org/about/awards/fellows/fellows.htm>

J. Daan Van Wyk
Chair, PELS Fellow Evaluation
Committee
daan@vt.edu

Photos from INTELEC 2001, Edinburgh, Scotland



TOP ROW (L-R): Bob Jurewicz, INTELEC CEC Chairman; John Parsons, British Telecom, and Chairman of INTELEC 2001; Tom Habetler, President of IEEE PELS / Günter Vau, of HI VOLT, Dresden, Germany; Kevin Fellhoelter, Consultant, Solara Technologies, USA;
BOTTOM ROW György Takács, Communication Authority, Hungary; Wilfried Schulz, Deutsche Telekom, Germany / Lars Björkström, Emerson Energy Systems, Stockholm, Sweden; John Hawkins, TELEPOWER Australia Pty, Ltd; Dan McMenamin, Dan McMenamin Associates, Inc, USA; and Steve Natale, Telejoule Corporation, USA.

PESC® 2002: From RAP to PWM

Problem/Wisdom Matching (PWM) is the process of matching the wisdom of our colleagues to a specified problem. Formerly called RAP (a term which now has additional unintended connotations) sessions, and briefly Brain Power Groups (good, but just not catchy enough), PWM sessions will satisfy the need to discuss and resolve issues of importance to power electronics professionals at the 2002 Power Electronics Specialists Conference (PESC).



The three topics that most satisfy the following criteria will be chosen:

- Of interest to many PESC attendees.
- Have sufficient volunteer panel members.
- Important to the profession.

Some topics suggested so far include:

1. Reform of the conference and/or journal paper review format, including:
 - Quality control of the process
 - Reviewer rewards and/or recognition
 - Identification of reviewers as having “endorsed” the paper
 - Author appeal process
 - Should PESC be fully reviewed?
 - Does the recording of academic (or other) advance need to be better organized?
 - Can we replace “serial” (time based) publications with “keyword” or “topic” based electronic access?
2. The teaching of power electronics:
 - “A knowledge of switching device physics is useless”?
 - Sharing of on-line resources
3. Battery and/or energy storage technology
 - The merits of various technologies
 - Differing power conversion requirements
4. Resolving the mismatch between academic pursuits and the needs of industry:
 - Selection of research areas
 - Bridging the gap between conceptual ideas and industrial practice
 - Ensuring there is a practical basis for research
5. Managing di/dt of low-voltage capacitors
6. EMI/RFI

CALL FOR PAPERS

WPET 2002

The 7th Biennial



Workshop on Power Electronics in Transportation

October 24–25, 2002 Detroit, Michigan USA

<http://www.engin.umd.umich.edu/ECE/~WPET>

Automotive systems represent one of the fastest growing areas of power electronics, with applications ranging from control of traditional actuators to emerging electric and hybrid drivetrain technologies. WPET 2002 will focus on various aspects of power electronic circuits and systems for automotive applications. The goal of this workshop is to provide an opportunity for the discussion in the following areas of interest:

Electric and hybrid drivetrains	Control systems
Motor drive and motion control	On-board power management
Fuel-cell technology	Power semiconductors and power ICs
Battery management	CAD/CAE
Inverters and converters	EMI/EMC
42V PowerNet	Thermal management and power packaging
Conventional load control	Other related topics

Deadlines

Submission of abstracts:	May 15, 2002
Notification of Acceptance:	July 1, 2002
Final manuscript due:	Sept 1, 2002

Preparation of Abstracts

Prospective authors should submit a 50-word Abstract and a three- to four-page Digest (including figures, tables and references) of their planned presentation. Both Abstract and Digest should be double-spaced on 8 1/2" x 11" or A4 size paper. All authors should obtain company and governmental clearance prior to submission of abstract. The Abstract heading must include the title of the presentation, names and affiliations of all author(s) and the Corresponding Author's mailing address, telephone and fax number, and e-mail address. If there are multiple authors the corresponding author must be clearly identified. Electronic submission of the Abstract, Digest, and final manuscript is highly encouraged.

Both Abstract and Digest should be submitted to:

Dr. John Shen	Dept. of Electrical and Computer Engineering
Tel: +1 313 593 5525	University of Michigan-Dearborn
Email: johnshen@umich.edu	4901 Evergreen Road
	Dearborn, MI 48128, USA

Co-sponsors:

IEEE Power Electronics Society
IEEE Southeast Michigan Section

If you have any ideas for topics you would like to see discussed, could contribute to topic discussions, or have suggestions for potential panel members, please email Lawrence Borle as soon as possible. For

current information, please visit the PESC'02 website at <http://www.pesc02.com/>

Lawrence Borle
PESC02 PWM Session Chair
L.Borle@curtin.edu.au

APEC Returns to Dallas *from pg 1*

tifier and control circuits.

In comparing the 15 professional education seminars in 2002 versus 2001, only 3 (teams) from 2001 will once again present Seminars. This illustrates the depth of our experts as well as our commitment to provide new topics of interest. It also shows that no one is automatically accepted solely due to his or her credentials or prior participation.

As the emerging 42 volt next-generation automotive electrical power systems are deployed, we are including a (co-authored) seminar on this topic that will include John Miller of Ford Motor Co. In addition, a debate on the 42V automotive bus will be one of our three interactive RAP Sessions being held on Tuesday evening. The other professional education seminars will focus on motor drives, PFC, dc/dc converters, solar/alternative energy, EMI, packaging and thermal management, HALT/HASS, optimizing semiconductors, and power supply design.

In addition to the 42 volt bus, the other two RAP Sessions will deal with ASICS and contract manufacturing. This is one opportunity whereby the attendee can challenge the experts on the concepts being debated.

Rounding out our program will be 12 exhibitor Education Seminars, the 16th annual Micro Mouse competition, and the Wednesday evening banquet held at the Dallas World Aquarium.

We will also have an Exhibition Hall with up to 148 booths where you can interact with factory direct experts on their latest product offerings while enjoying our catered reception on Monday evening. A drawing will be conducted Tuesday evening in the Exhibit Hall, and some lucky attendees will carry home a camcorder, digital camera, GPS system or a DVD. All winners need to be present in the Exhibit Hall to qualify.

For additional information, including on-line registration, please check www.apec-conf.org or contact the APEC office at +1 202 973 8664.

On behalf of the entire Conference Committee let me express our gratitude for your prior participation and extend a warm welcome to APEC 2002. We thank you for your patronage of the Conference and look forward to greeting you in Dallas.

On a personal note, this will be my last APEC conference, and I would like to see you so I can personally extend my best wishes to each of you.

Larry Gilbert, APEC Publicity Chair

FEPPCON Projects Future of Power Electronics

The fourth IEEE International Workshop on The Future of Electronic Power Processing and Conversion (FEPPCON) was held May 27–29, 2001. This series of workshops was started in the late 1980's to explore future developments in our field. The experience during the past ten years has confirmed the need and value of these Workshops.

This workshop was hosted and sponsored by the Electrical Machines and Power Electronics Group of the Department of Electrical, Electronic and Systems Engineering of the University of Catania, Italy. It was held at a new venue on Salina, one of the picturesque Eolian Islands north of Sicily. A relatively small group from industry and the university brainstormed over what the future holds in store. Technological issues were discussed on the first day, and applications on the second day.

The main theme was to identify changes expected during the next 5 years and to strategize where we want power electronics

to be by the year 2010. There were two primary objectives: (1) identify key issues and the real "show stoppers" in power electronics technology, and (2) identify the fundamental limitations and technological problems that must be addressed in power electronics technology.

We attempted to be bold in our projection into the future; otherwise we will end up with the same type of discussions that we have at the usual conferences. In our bold projections, we considered what present constraints that we accept as given must be thrown away, because they are tied to our present way of thinking, manufacturing, teaching, designing.

The discussions were fruitful and led to the following shortened version of workshop conclusions:

- For low-power applications, the integration will continue to the points of minimum cost, driven by the requirements for miniaturization, reliability, and performance.

Continued on page 11





INTELEC® Fellowship Announcement

The Advisory and Conference Executive Committees of the International Telecommunications Energy Conference (INTELEC) have established an annual \$10,000 Fellowship targeted for electrical engineering graduate students who are specifically involved in areas of power electronics applicable to communications. The applicable systems include wireline, optical, wireless, or any combination of systems including the internet and older imbedded telecommunications systems. Alternative energy systems for the communications network are also applicable.

This Fellowship is international and is open to individuals from all countries. The recipient must be an electrical engineering graduate student. Only one INTELEC fellowship grant can be received by an individual. It is a one-time grant for the recipient.

Interested electrical engineering graduate students should submit:

- A short essay (no more than one page) explaining how their proposed project can be applied to the powering of communications systems.
- A transcript of their grades
- A letter of support from their academic graduate advisor

These materials should be submitted by **31 January 2002** to the Chair of the IEEE Power Electronics Society Educational Activities Committee:

Associate Professor Marcelo Godoy Simoes
Chair, IEEE/PELS Educational Activities Committee
Colorado School of Mines
Golden, CO 80401-1887 USA

The INTELEC Fellowship recipient will be notified by 29 March 2002.



IEEE POWER ELECTRONICS SOCIETY
Best Chapter Award Form



Section / Council Affiliation _____

Chapter Chairman _____

Please complete the following information about your chapter, which will be evaluated by the Best Chapter Award Evaluation Committee.

1) Number of: Regular members _____ Student members _____

2) Do you have a Web site? YES () Address: _____ NO ()

TECHNICAL ACTIVITIES:

3) Local & Regional Lectures (Please attach a list of the lecturers and speakers and any additional information.)

4) Conferences & Seminars organized (Please attach all related information.)

5) Use of the Distinguished Lecturer Program (Please attach all the important information about the lecturers invited and the results of the events.)

6) Plan of activities (Describe the plan of activities for the following year.)

7) Other related activities (Describe any other technical activity related to the promotion of Power Electronics in the Chapter's zone of influence.)

Date: _____ Chair's Signature _____

INSTRUCTIONS: Complete this application form adding up to three additional pages if necessary to answer the questions completely and send it to Jaime Arau (PELS Chapters Development Chair) by email (j.arau@ieee.org), by fax (+52 777 312 23 14) or by regular mail to Interior Internado Palmira s/n, Col. Palmira, Cuernavaca 62490, Mor., Mexico, before March 1, 2002.

FEPPCOM Report *from page 9*

- For medium-power applications, the total system integration still leaves a lot of room for improvements in cost, power modules, control and sensing, passives, reliability, and performance.
- For very high-power applications, modularization will be expanding, provided the system cost, efficiency, flexibility, and EMC are taken into account.
- Fast energy storage is required in numerous applications. At present the super capacitors seem the most promising solution for energies up to 5 kWh. In the next ten years, all other energy storage options will continue to be considered.
- High ratio of peak/average power rating is important in numerous applications and is thermally limited. In order to push the limits we need to use active temperature control, improved electro-thermal CAD modelling, increased thermal capacitance in the packages, and better power interconnects.

The full Workshop Proceedings and conclusions can be viewed at <http://www.dees.unict.it>. Click on the "FEPPCON IV" Link, and then respond to the login prompts as follows:

Login: feppcon4

Password: websit3

Daan van Wyk

*FEPPCON Steering Committee Chair
Virginia Polytechnic and State
University, USA
daan@vt.edu*



Planning for FEPPCON (from left):
Workshop Chair: Alfio Consoli, University of Catania, Italy;
Technical Program Co-chair: Frede Blaabjerg, Aalborg University, Denmark;
Steering Committee Chair: Daan van Wyk, Virginia Polytechnic and State University, USA;
Technical Program Chair: Braham Ferreira, Delft Technical University, The Netherlands.

IEEE Press and Wiley Create Joint Imprint

On December 2, 2000, the IEEE Executive Committee approved a proposal enabling the IEEE Press to join John Wiley & Sons in a co-branded imprint that will include future titles from both publishers. Under the plan, the IEEE Press will work with authors to acquire titles, and Wiley will handle everything else: production, marketing, warehousing, sales, and order fulfillment. Wiley will also contribute its own electrical and electronics engineering titles to the imprint, subject to IEEE review. Books in the co-branded imprint will carry the logos of both organizations. Each party will be responsible for its own expenses, and Wiley will pay a royalty to the IEEE from sales of the books in the imprint. Implementation of the plan was completed in April, 2001.

According to the IEEE Press, the plan presents the opportunity to advance the mission of the IEEE book program, providing essential books for IEEE members at a discount and enhancing the image of the IEEE within the technical community. At the same time, the IEEE expects to significantly reduce the costs of the book program by taking advantage of Wiley's economies of scale in production and worldwide marketing. The IEEE member benefit of a 15% discount for IEEE Press books was preserved in the partnership agreement, and that feature was extended to Wiley books included in the imprint.

John Wiley & Sons, Inc., was founded in 1807, and it is a global publisher of print and electronic products. The company specializes in scientific, technical, and medical books and journals; professional and consumer books and subscription services; and textbooks and educational materials for undergraduate and graduate students as well as lifelong learners. The Wiley family remains actively involved in the business, which is traded on the NYSE. The IEEE brings to the partnership its status as the world's largest technical professional society, with more than 360,000 members in approximately 150 countries. Through these members, the IEEE is a leading authority in all areas of electrical engineering. The IEEE produces nearly 30 percent of the world's literature in the electrical and electronics engineering and control technology fields. It has created more than 800 active consensus standards, and sponsors or cosponsors more than 300 technical conferences each year.

Those interested in having their work published and globally distributed under the Wiley/IEEE co-brand should follow the IEEE Press Proposal Guidelines provided on the Web at <http://www.ieee.org/organizations/pubs/press/prpgd.htm>. Potential authors of books in the field of the Antennas and Propagation Society (AP-S) should also contact Robert Mailloux, Chair of the AP-S Press Liaison Committee, AFRL/SNH, Hanscom AFB, MA 01731-2909 USA; Tel: +1 781 377 3710; Fax: +1 781 377 5040; E-mail: Robert.Mailloux@hanscom.af.mil. IEEE Press books can be purchased on the Web at <http://shop.ieee.org/store>; note the instructions for requesting the IEEE member discount from Wiley. Wiley's website is located at <http://www.wiley.com>.

Bill Hazen

*PELS Liaison to IEEE Press
blhpp@ma.ultranet.com*

Sloan Career Series Discounted

Seize the opportunity to enlarge your Section or Society Library with the Alfred P. Sloan Foundation non-profit, award winning, "Sloan Career Cornerstone Series." The new discounts make the sets available at \$50 instead of the list price of \$350 for either nine videos or nine CD-ROMs. They are ideal for your pre-college outreach activities.

The Series helps students make informed career decisions based on the day-to-day experiences of those already working in the technical fields of engineering, mathematics, and the physical sciences. Topics covered include career paths available to a variety of scientists and engineers including electrical engineers and computer scientists.

The sets were developed, with support from the Sloan Foundation, in a unique partnership between eleven engineering, mathematics, and physical science associations including the IEEE. Videotapes run 25 to 64 minutes in length; CD-ROM's include extensive career, salary, and career profile databases plus Internet links.

For more information, or to purchase at the discount level, visit www.careercornerstone.org and download the special discount order form, or e-mail sccsinfo@aol.com to request a form via fax, mail, or e-mail attachment.

Lynn Murison

*Outreach Administrator
IEEE Educational Activities
Ph: +1 732 562 6526*

www.ieee.org/organizations/eab/

Meetings of Interest to PELS Members

The *IEEE Transactions on Power Electronics* will devote a Special Issue to digital control in power electronic circuits and drives. Papers must be submitted by February 1, 2002.

APEC® 2002, the 17th 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 the article and flyer in this *Newsletter* or visit <http://www.apec-conf.org> for details.

PCC-Osaka 2002, the IEEJ/IEEE Joint IAS Power Conversion Conference, is planned for April 2 – 5, 2002 in Osaka, Japan. PEDS '01 is held in technical cooperation with the IEEE Power Electronics Society and numerous other organizations. For further information see <http://www2.convention.co.jp/pcc/>.

PEMD 2002, the IEE 1st International Conference on Power Electronics, Machines & Drives, is scheduled for April 16 – 18 at the University of Bath, Bath, England. The IEEE Power Engineering Society, Power Electronics Society, and Industrial Applications Society are technical co-sponsors. For additional information visit <http://www.iee.org/events/confexh/pemd/>

www.iee.org/events/confexh/pemd/

PES'02, the 6th International Conference on Power and Energy Systems, will be held in Marina del Rey, CA, USA on May 13 – 15, 2002. PES 02 is comprised of 4 symposia, and the IEEE Power Electronics Society is a technical co-sponsor. For complete information, see <http://www.iasted.com/conferences/2002/marina/pes.htm>.

COMPEL 2002, the 8th IEEE Power Electronics Society Workshop on Computers in Power Electronics, will be held June 3 – 6, 2002 at the University of Puerto Rico in Mayagüez, Puerto Rico. For details visit <http://ece.uprm.edu/~compel>.

SPEEDAM 2002, a Symposium on Power Electronics, Electrical Drives, Automation & Motion, will be held June 11–14 in Ravello, Italy. The IEEE Power Electronics Society is a technical co-sponsor. See <http://www.speedam.unina.it/> for details.

PESC® 2002, the 33rd Annual IEEE Power Electronics Specialists Conference, will be held June 23 – 27, 2002 in Cairns, Australia. PESC is sponsored exclusively by the IEEE Power Electronics Society. For additional information see the articles in this *Newsletter* or visit <http://www/pesc2002.com/>.

EPE-PEMC 2002, the 10th Interna-

tional Power Electronics and Motion Control Conference, will be held September 9 – 11, 2002 in Cavtat and Dubrovnik, CROATIA. For additional information visit <http://www.fer.hr/epe-pemc2002>.

INTELEC® 2002, the 24th International Telecommunications Energy Conference, will be September 29 – October 3, 2002 in Montréal, Canada. The IEEE Power Electronics Society is the sole sponsor in even years, and is a technical co-sponsor in odd years. Visit <http://www.intelec.org> for additional information.

CIEP 2002, the 8th IEEE International Power Electronics Congress, will be held October 20 – 24 in Guadalajara, Mexico. The IEEE Power Electronics Society is a technical co-sponsor. Visit <http://ciep2002.iteso.mx> for details.

WPET 2002, the 7th Biennial Workshop on Power Electronics in Transportation, takes place October 24 – 25 in Detroit, Michigan, USA. WPET is co-sponsored by the IEEE Power Electronics Society and the IEEE Southeast Michigan Section. Abstracts are due May 15, 2002. For more information visit <http://www.engin.umd.umich.edu/ECE/~WPET> or see the Call for Papers in this *Newsletter*.

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