APEC® 2003

Eighteenth Annual
Applied Power
Electronics
Conference and
Exposition

Advance Program

FEBRUARY 9 – 13, 2003
FONTAINEBLEAU HOTEL
MIAMI BEACH, FLORIDA

Co-sponsored by

APEC 2003
2025 M Street, Suite 800
Washington, DC 20036

February 9 - 13, 2003
Fontainebleau Hotel
Miami Beach, Florida

GENERAL INFORMATION

Applied Power Electronics Conference
And Exposition
February 9-13, 2003
The Fontainebleau Hotel
Miami Beach, Florida
www.apec-conf.org
Co-Sponsored By
IEEE Power Electronics Society
Power Sources Manufacturer's Association
IEEE Industry Application Society

Miami Beach, Florida will be the site for APEC 2003, the eighteenth in a series of highly successful technical conferences and Exhibitions dedicated to serving the needs of power-electronics professionals. The conference will be at the Fontainebleau Hotel, located on Miami Beach. APEC 2003 is planned to be in the same style as previous conferences with the popular series of Professional Education Seminars on Sunday and Monday morning, Technical Sessions on Monday afternoon through Thursday, and the Exhibition on Monday through Wednesday. The MicroMouse contest will be on Monday evening and the Vendor Seminars followed by the Rap Sessions on Tuesday. On Wednesday, we are planning for a grand evening of good food and entertainment.

APEC has become a very useful and lively conference for promoting new ideas, meeting old friends and making new ones, exchanging news and learning about the power electronics industry. This year's Conference Committee, comprised of volunteers from industry and academia and the professional conference management firm Courtesy Associates, is working diligently to provide you with an enjoyable and useful conference experience. On behalf of the APEC 2003 Conference Committee and the Conference Sponsors, I invite you to participate in every possible way to make APEC 2003 a memorable event.

Bruce Miller
General Chair

APEC WEB SITE

For the latest information on APEC, please consult the APEC web site at **www.apec-conf.org.** The web site has the latest news and information, access to on-line registration and downloadable registration forms.

FOR MORE INFORMATION

If the information you need is not in this program or on the APEC web site, inquires can also be directed to:

APEC 2003
2025 M Street, NW, Suite 800
Washington DC 20036 USA
Telephone: +1-202-973-8664
Facsimile: +1-202-331-0111
Email: APEC@courtesyassoc.com

APEC HIGHLIGHTS

TECHNICAL SESSIONS

APEC will offer a total of 28 Technical Sessions with 189 papers on a wide range of topics including ac-dc power supplies, dc-dc converters, motor drives, inverters, lamp ballasts and magnetics. The Plenary Session on Monday afternoon features a combination of papers on special topics from noted industry experts as well as a selection of papers from those submitted for general review.

PROFESSIONAL EDUCATION SEMINARS

APEC's Professional Education Seminars give you a unique opportunity to hear some of the world's foremost authorities in power electronics for a fraction of the price that other conferences charge. This year, APEC received 33 proposals, each of them excellent, for the 15 available seminar sessions. Choosing was not easy but APEC 2003 will have another superb seminar program.

EXHIBITION

The APEC 2003 Exhibition is one of the biggest ever with over 150 booths featuring all the latest and greatest products and services from the leading companies in the power electronics industry.

The Exhibition Hall is also the social center of APEC. Whether it is during one of the conference receptions or during the luncheons, the Exhibition Hall is the place to be. APEC's Exhibitors are also offering a series of seminars on Tuesday afternoon so that you can get an in-depth look at the latest solutions to your power electronics challenges.

MICROMOUSE CONTEST

APEC will once again host the premier MicroMouse contest in North America, drawing contestants from all over the world. Come by the Fleur De Lis room at 8:00 PM on Monday to cheer your favorite mouse to victory.

If you are interested in entering a MicroMouse in the contest, please see the APEC web page for information and instructions. Information is also available from the APEC 2003 offices.

RAP SESSIONS

Hot, current, controversial and even emotional topics are traditionally explored at APEC's Rap Sessions and this year is no different. APEC is pleased that three of the industry's most well known contributors are leading discussions on topics that will affect everyone at the conference. Don't miss your chance to hear the industry pundits on both sides of these issues and to let your opinion be heard.

CONFERENCE BANQUET

APEC 2003 will spend the evening of Wednesday, February 12th, aboard the Lady Windridge, a beautiful yacht that sails around the Miami waterway. Enjoy the music of a four-piece steel drum band and delight in some wonderful food while we take in the sites and sounds of the ocean.

You will have the chance to meet up with old friends and new ones aboard this luxurious boat in a casual and relaxed atmosphere.

SPOUSE AND GUEST PROGRAM

APEC welcomes the spouses and guests of the APEC conference participants. A welcoming breakfast will be held on Monday, February 10th. Afterwards, the Classic Miami tour is available. This tour starts with a visit to the Freedom Tower in downtown Miami. From there the tour visits the Pier 5 open-air market in Bayside, the quaint historic village of Coconut Grove and will conclude in the colorful Art Deco District. On Tuesday, February 11th, a tour of the Miami Waterway, highlighting the "star's homes" of Miami, modern Miami with its famous skyline and the beautiful intra-coastal waterway.

Spouses and guests are also welcome at conference activities like the Exhibit Hall receptions and the MicroMouse Contest.

MIAMI WEATHER IN FEBRUARY

February is late winter in the Miami area. The average daily high temperature is 24 °C (76 °F) and the average daily low temperature is 16 °C (60 °F). The monthly average rainfall is 2.0 in., so be prepared for the occasional spring rain shower.

GETTING AROUND MIAMI BEACH

Yes, there is public transit, but to go to most places will require a taxi or car.

If you do not wish to rent an automobile, there are several economic methods of public transportation available throughout Greater Miami and the Beaches. Metrorail is a 21-mile elevated rail system that serves Downtown Miami and extends west to Hialeah and south to Kendall, with stops approximately every mile. Metromover features individual motorized cars that run atop a 4.4-mile elevated track looping around Downtown Miami and to the Brickell and Omni business districts. Metrobus offers more than 60 routes in Miami-Dade County. Tri-Rail is a commuter rail system with 15 stations throughout Dade, Broward and Palm Beach counties.

FOR MORE INFORMATION

For more information on Miami events and activities, check out the Miami Convention and Visitor's Bureau website, **www.tropicoolmiami.com**.

CONFERENCE REGISTRATION

In order to participate in APEC 2003 activities, one must register with the conference. Registration for the Professional Education Seminars and Technical Sessions requires payment of the appropriate registration fees. We recommend that you register in advance if at all possible.

Admission to the Exhibition Hall is complimentary, but one must register at the Conference Registration Center and receive a badge that allows entrance. Exhibition Only registrations are only done at the conference and cannot be done in advance.

A complimentary registration is available to spouses and guests who wish to participate in APEC's Spouse and Guest Hospitality Program.

REGISTRATION FEES

Membership

Member registration rates are available to all current IEEE members and employees of companies that are current members of the Power Sources Manufacturer's Association (PSMA).

To make sure there is no delay in processing your registration or checking in at the conference, please indicate on the registration form how you qualify for the Member rates by providing either your IEEE membership number or the name of your employer in the space provided.

Advance Registration

To be eligible for the Advance Registration rates, registrations must be received at the APEC registration offices or through the on-line registration system no later than the close of business on Monday, January 6, 2003.

Professional Education Seminars

Member $250.00
Non-Member.....$300.00

Technical Sessions

Member $350.00
Non-Member.....$425.00

Late Or On-Site Registration

Professional Education Seminars

Member $300.00
Non-Member.....$350.00

Technical Sessions

Member $425.00
Non-Member.....$500.00

IEEE Life Members And Students

Professional Education Seminars $50.00
Technical Sessions $100.00

When registering at the conference, you will be required to show identification to receive the Life Member and Student rates. Student rates require full time registration at an accredited institution.

WHAT'S INCLUDED

Professional Education Seminars

Registration for the Professional Education Seminars includes one copy of the Seminar Workbook in hard copy and admission to any or all of the Professional Education Seminars. Unlike some conferences that require a separate registration fee for each seminar, APEC gives you your choice of as many seminars as you can attend for one low registration fee.

Also included in the registration fee for the Professional Education Seminars is admission to the:

- Exhibition Hall
- Exhibition Hall receptions
- Exhibitor's Seminars
- MicroMouse Contest
- Rap Sessions

Technical Sessions

Registration for the Technical Sessions includes one copy of the Proceedings in hard copy, one copy on CD-ROM and admission to any or all of the Technical Sessions.

Also included in the registration fee for the Technical Session is admission to the:

- Conference Banquet
- Exhibition Hall
- Exhibition Hall receptions
- Exhibitor's Seminars
- MicroMouse Contest
- Rap Sessions

Exhibition Only

Included in the no-charge Exhibition Only registration is admission to the:

- Exhibition Hall
- Exhibition Hall receptions
- Exhibitor's Seminars
- MicroMouse Contest
- Rap Sessions

Exhibition Only registrations must be done at the conference; they cannot be done in advance.

Spouse And Guest Registration

Spouses and guests accompanying APEC attendees are encouraged to register with the conference. Spouses and Guests who register with the conference will receive a badge allowing admission to the:

- APEC Spouse And Guest Hospitality Room
- Spouse And Guest Welcoming Breakfast
- Exhibition Hall
- Exhibition Hall receptions
- Exhibition Hall luncheons (with separately purchased ticket)
- Conference Banquet (with separately purchased ticket)
- MicroMouse Contest
- Rap Sessions

HOW TO REGISTER

On-Line Registration

On-line registration is available through the APEC website, www.apec-conf.org. A Master Card, Visa or American Express card will be required.

Registering By Mail Or Fax

A conference registration form is included in this Conference Program or one in Adobe® Acrobat® format can be downloaded from the APEC website, **www.apec-conf.org**.

Complete this form and send it by mail or fax to the APEC Registration Center:

APEC 2003/Badgeguys.com
1627 Palisades Drive
Carrollton, TX 75007 USA
Facsimile: +1-972-881-1747

Registrations sent by mail must include payment by credit card, check or money order. Checks may be personal, business or certified. All checks and money orders must be payable in United States dollars and drawn on a United States bank. If you wish to pay with a credit card, APEC accepts Master Card, Visa and American Express. Be sure to include your credit card number and expiration date where indicated on the registration form. Please do not send cash.

Registrations sent by fax must include payment by credit card. Be sure to include your credit card number and expiration date where indicated on the registration form.

Checks and money orders returned unpaid or credit card payments for which payment was refused will be assessed an additional handling charge of $25.00.

Registering At The Conference

You may also register at the conference at the Conference Registration Center. For payments at the conference, APEC will accept credit cards (Master Card, Visa or American Express) or

checks or money orders (payable in U.S dollars and drawn on an U.S. bank).

CONFERENCE REGISTRATION CENTER

When you arrive at the conference, please go the Conference Registration Center, located in the Grand Gallerie, to register and pick up your conference materials.

The Conference Registration Center will be open:

Saturday, February 8 .....3:00 PM–6:00 PM
Sunday, February 9 .....8:00 AM–5:00 PM
Monday, February 10.....8:00 AM–3:00 PM
Tuesday, February 11 .....8:00 AM–3:00 PM
Wednesday, February 12 .....8:00 AM–3:00 PM
Thursday, February 13 .....8:00 AM–12:00 Noon

CONFIRMATION OF REGISTRATION

All Advance Registrants will be sent a post card confirming that their registration has been received. The post card will include your name and address, events for which you registered, any extra items purchased and amounts paid. However, to protect your privacy, it will not contain any information about the method of payment.

Registrations received after the Advance Registration Deadline does not allow time for a confirmation to be sent by mail.

CANCELLATION & REFUND POLICY

All requests for cancellation and refund of registration fees must be received in writing at the APEC offices no later than the close of business **Monday, January 6, 2003**. All refunds will be processed after the conclusion of the conference and will be subject to a $50.00 processing fee.

For those who register and are unable to attend the conference, any Proceedings, Seminar Workbooks or other printed materials to which you are entitled will be shipped to you within 30 days of the conclusion of the conference.

TRAVEL AND ACCOMMODATIONS

CONFERENCE HOTEL

The Fontainebleau Hotel in Miami Beach, Florida will be the center of activity for APEC 2003. Your conference experience will be enhanced if you stay in the conference hotel. The Fontainebleau Hotel is located at 4441 Collins Avenue, Miami Beach, Florida.

Hotel Room Rates

A block of rooms has been reserved for the APEC 2003 participants at the Fontainebleau Hotel at special conference rates. Be sure to mention that you are with the "IEEE APEC" when making a reservation to qualify for these rates:

Single $189.00
Double $209.00

Current city and state taxes are additional.

It is imperative that you make your reservation before Monday, January 6, 2003. After January 6, 2003, reservations will be confirmed only on a space available basis.

Reservations

To make a reservation, please call the hotel directly and reference "IEEE & APEC". You may also complete the hotel reservation form and mail or fax it with **one night's payment** (check or major credit card) to:

The Fontainebleau Hotel
Reservations
4441 Collins Avenue
Miami Beach, Florida 33140

A hotel registration form is included in this Conference Program or one in Adobe® Acrobat® format can be downloaded from the APEC website, **www.apec-conf.org**.

Contacting The Fontainebleau Hotel

To reach the Fontainebleau Hotel by phone or fax:

Reservations Only
Phone: 1-800-HILTONS, 1-800-445-8667, or 1-800-548-8886
Fax: 1-305-674-4607

All Other Inquiries
Phone: 1-305-538-2000
Fax: 1-305-674-4607

AIRLINE DISCOUNT PROGRAM

American Airlines will be the official airline for APEC 2003. They are offering a number of discount fares for APEC attendees traveling to Miami. To take advantage of these low fares, give the APEC 2003 conference identifier number, A7823AC, to your travel agent or call American Airlines at their special Meeting Services Desk Toll Free Number: 1-800-433-1790.

GROUND TRANSPORTATION

The Fontainebleau Hotel, in Miami Beach, is served by all the cab and shuttle services operating at the Miami International airport (MIA).

Taxi Service

Taxicab service is available at designated areas along curbside exits. Fares to Miami Beach are approximately $31.00 for one person.

Shared Ride Services

Several shared ride companies provide ground transportation between the Miami Beach International Airport and the Fontainebleau Hotel. Shared ride services at Miami International Airport operate from the ground level of the terminal, outside the baggage claim area. When using Super Shuttle/Miami from the airport reservations are not needed.

Super Shuttle 817-329-2001

The Super Shuttle service charges approximately $13.00 per person one-way from the airport to the Fontainebleau Hotel.

A list of several other transportation companies that will offer only pre-arranged service to the airport can be found on the Miami International Airport web page, **www.miami-airport.com**.

Car Rental

Once again this year, AVIS will offer attendees a special conference rate. To take advantage of this special rate, call the AVIS Meeting Reservation and Information Desk at 1-800-331-1600 or contact them online at www.avis.com. Identify yourself as eligible for the APEC rate by the giving the AWD discounts number, B136000.

Parking At The Fontainebleau Hotel

The Fontainebleau Hotel offers self-parking in their garage. The rate is $16.00/night.

SPOUSE & GUEST PROGRAM

Spouses and guests are encouraged and invited to attend the APEC 2003 Conference. Aside from the APEC activities, the Miami Beach area offers an enormous range of cultural, sightseeing and shopping activities.

In addition to the Spouse and Guest specific activities, spouses and guests are welcome at all APEC social and dining events. Please be sure to register for a badge in order to participate.

In particular, spouses and guests are welcome at the Exhibitor Receptions (badge required), Exhibition Hall Luncheons (ticket required), the Conference Banquet (ticket required), Rap Sessions (badge required) and the MicroMouse Contest.

SPOUSE & GUEST HOSPITALITY ROOM

So that the spouses and guests of APEC attendees can have a place to meet friends old and new, chat over a cup of coffee, plan the next expedition into the city or just hang out, APEC will have a Spouse And Guest Hospitality room available. This year the Spouse and Guest Hospitality room will be located in the Imperial IV room.

The room will be open as follows:

Monday, February 10.....8:30 AM–5:00 PM
Tuesday, February 11 .....8:30 AM–5:00 PM
Wednesday, February 12 .....8:30 AM–5:00 PM
Thursday, February 13 .....8:30 AM–12:00 Noon

Coffee will be served Tuesday through Thursday from 8:30 AM to 9:30 AM.

TOURS AND EVENTS

Monday, February 10th, 8:30–9:30 AM
Welcoming Breakfast
Spouse And Guest Hospitality Room

To help you start off what will be an exciting week, APEC is serving a continental breakfast for spouses and guests on Monday morning. This is a great time to meet old friends and make new ones. There will be an information person available to answer questions about things to do and see in Miami Beach.

This event is complimentary to registered spouses and guests but you must have your name badge to be admitted.

Monday, February 10th, 10:00 AM – 3:00 PM
Classic Miami Tour

This is a fabulous way to get a feel for the vibrant and unique atmosphere of Miami, stopping throughout the city to experience some of its history, architecture and perhaps do a little shopping along the way. The tour will begin in the Miami downtown area around Brickell Avenue to catch a beautiful view of the city's skyline and Biscayne Bay. From there you will move onto the Freedom Tower, originally constructed in 1924, it became home to the Miami News in 1957. During the 1960's it became the center for the more than 450,000 Cuban exiles, where they were processed after fleeing Communist Cuba. Currently the Tower is waiting to be renovated into the Cuban-exile Museum. From the Freedom Tower onto Bayside, Miami's hottest new spot for shops, delicious food and great people watching. Along with Baysides seven waterfront restaurants and wonderful shopping is the Pier 5 Market an open-air gallery capturing the international flavor of this international town. Next is Coconut Grove a quaint historic village just south of downtown and nestled on Biscayne Bay. The tour will take you to the home of Commodore Monroe, Plymouth Church, Admirals Row and the Gables. Boutiques, antiques, art galleries and restaurants await you in this wonderful little town by the bay. The tour concludes in the Art Deco District of Miami Beach, home to the world's largest collection of Art Deco architecture and art.

The cost is $36.00 per person.

Tuesday, February 11th, 9:30 AM – 2:30 PM
Miami Waterway Tour

What better way to see Miami then from the water. Guests will be transferred to Bayside to begin their waterway tour of the city. The tour begins with a cruise through the port channel, the "star's homes" and even the exclusive island in the bay, Fisher Island. From there the captain will take the group on a tour of the famous Miami skyline, the Miami Beach Marina, South Beach, the Art Deco District and of the course the beautiful intercostals waterways. At the conclusion of the tour, guests will have an opportunity to do a bit of shopping at Bayside.

The cost is $62.00 per person.

CONFERENCE BANQUET

Wednesday, February 12, 2003,
TBD – 10:00 PM

After four days of intense reading, listening and discussing our trade, this will be a time to slow down, relax a bit and enjoy food, drink and conversation with our friends and colleagues.

This year's APEC Conference Banquet will be held on board the magnificent yacht, the Lady Windridge.

While enjoying the beautiful inter-coastal waterways, you will be steeled away by the music of a four-piece calypso band. Food and drink will be served throughout the yacht. You won't want to miss this special evening.

Instructions on when and where to board the yacht will be posted at the registration counter. You will be required to have a banquet ticket in order to board the Lady Windridge.

The Banquet is included in registration fee for the Technical Sessions. Additional tickets can be purchased for $40.00.

DINING AT APEC

DINING IN THE HOTEL

With over 10 places to eat at the Fontainebleau Hotel, there is a little something for everyone, from the fine dining Mediterranean dishes at the **Bleau View** to cool cocktails at the **Lagoon Salon**.

In addition to these two locations, there is **Trop-Art Café**, which offers a casual dining experience, with daily specials and a buffet breakfast.

Club Tropigala offers a unique Caribbean dining experience, along with an amazing show from the Far East, the **Imperial Circus**.

Tapas Under the Trees is a colorful bistro where you enjoy a few appetizers, with a pitcher of Sangria, in a wonderful outdoor setting. **Stephen's** also offers guests an opportunity to unwind in its intimate cocktail lounge.

The Garden Lobby Bar is a popular stop for guests who have just checked in and allows them the view of the two-story glass wall.

You can sip exotic pina coladas at **Coconut Willies** with a view of the beach and rock grotto pool.

For a little healthy snack you can indulge in the fabulous tastes of the **Spa Café**.

If sushi is more to your liking, then we have the perfect place for you, **Kamon's**, offering authentic Japanese cuisine.

Finally, there is the **Beach Broiler** an Oceanside casual atmosphere that offers light meals and snacks. Included on the menu are Caribbean jerk sandwiches, hamburgers and refreshing fruit salads.

LUNCH WITH THE EXHIBITORS

Lunch will be served in the Exhibition Hall on Tuesday and Wednesday. Advance purchase of a ticket is required. For details, please see Exhibition Hall Luncheons on page 21.

ADDITIONAL INFORMATION

PURCHASING ADDITIONAL CONFERENCE PROCEEDINGS AND SEMINAR WORKBOOKS

Through Advance Registration

Conference registrants can purchase extra copies of the Conference Proceedings and Seminar Workbooks through Advance Registration. Those who would like extra copies are strongly encouraged to purchase them through the Advance Registration.

APEC reserves the right to limit quantities of APEC Proceedings or Seminar Workbooks sold to any one person or institution.

Advance purchase prices with registration for the conference:

Conference Proceedings $70.00
(Includes both Hardcopy and CD-ROM)
Seminar Workbook $60.00
(Hardcopy only)
Both Proceedings And Seminar Workbook $120.00

These prices are only available when your order is received with your paid conference registration by January 6, 2003. Publications purchased with advance registration will be available for pick-up when you register for the conference.

Advance Purchase Without Conference Registration

You may order copies of the APEC publications in advance of the conference without registering for the conference. Please use the APEC 2003 Pre-Conference Publications Order Form, included in this program and available for download from the APEC website. Your order with payment must be received at the APEC 2003 offices by January 6, 2003.

Conference Proceedings $70.00
(Includes both Hardcopy and CD-ROM)
Seminar Workbook $60.00
(Hardcopy only)
Both Proceedings And Seminar Workbook $120.00

The books will be shipped after the conference and requires payment of a shipping and handling charge. Shipping to locations in the United States and Canada is $25.00 per order. Shipping to locations other than the United States or Canada is $80.00 per order.

APEC reserves the right to limit quantities of APEC Proceedings or Seminar Workbooks sold to any one person or institution.

At The Conference

A limited number of copies of the Conference Proceedings and Seminar Workbooks may be available for sale at the Conference Registration Center, starting at noon on Wednesday, February 12. If there are any extra copies available, the prices will be:

Conference Proceedings $100.00
(Includes both Hardcopy and CD-ROM)
Seminar Workbook.....$100.00
(Hardcopy only)
Both Proceedings And Seminar Workbook $175.00

Through The IEEE

After the conference, the APEC Proceedings may be purchased through the IEEE. Contact:

IEEE Single Copy Sales
445 Hoes Lane
Piscataway, New Jersey 08854 USA
Telephone: +1-800-678-4333 (USA & Canada)
+1-732-981-0060 (Rest Of The World)
Website: www.ieee.org/products/

Special Note On Seminar Workbooks

The APEC Professional Seminar Education Workbook will not be available through the IEEE or any other source after the conference. If you want extra copies of the Seminar Workbook, you are strongly encouraged to buy them through Advance Registration.

SPONSOR MEMBERSHIP DESK

Each of the organizations sponsoring APEC will have membership desks. Individuals can inquire about membership in the **IEEE** and the two societies that sponsor APEC, the **Power Electronics Society** and **Industry Applications Society**. **The Power Sources Manufacturers Association (PSMA)** will also have a membership desk where organizations interested in joining can obtain information.

MESSAGE CENTER

A bulletin board for messages will be placed near the main conference registration area. Messages can be received and posted whenever the Conference Registration Center is open. Please advise any callers who may wish to reach you to call the main number of the Fontainebleau Hotel (+1-305-674-4607) and ask for the IEEE APEC 2003 Message Center. APEC participants are encouraged to regularly check the message board.

SACK SITTERS

Sack Sitters will be on site from Monday, February 10 through Thursday, February 13. Sack Sitters offers packaging and shipping of APEC Proceedings, Seminar Workbooks and conference materials

to any destination. The Sack Sitters desk will be near the main registration area. Please check at the conference for Sack Sitters' operating hours.

IMPORTANT NOTICES

BADGES

Badges are required for admission to all Professional Education Seminars, Technical Sessions, Rap Sessions and the Exhibition Hall. Please wear your badge at all times so that you will not be delayed at the entrance to an event.

RECRUITING

IEEE Policy #10.1.24 prohibits recruiting at IEEE sponsored conferences. Consequently, recruiters and recruiting advertisements will not be permitted in the APEC 2003 hotel space, meeting facilities or Exhibition Hall.

DISTRIBUTION OF COMMERCIAL MATERIAL

Distribution of commercial material by organizations not participating in the Exhibition is prohibited in the APEC 2003 hotel space, meeting space and Exhibition Hall.

PROFESSIONAL EDUCATION SEMINARS

APEC 2003 features 15 professional education seminars with a broad range of topics. The conference committee has worked hard to make sure there is something of interest to all APEC attendees during each of the seminar time periods. As always, APEC seminars offer a practical mix of theory and application for the professional working in power electronics. Unlike other conferences that charge by the seminar, at APEC one low fee gains you access to any and all of the seminars, along with the notes for every seminar. Whether you want to review an important topic area, broaden your understanding of a neighboring discipline, or take advantage of the practical experiences of experts in the field, the APEC 2003 seminars are a must for every conference attendee.

Please note that the room assignments are tentative and subject to change. Please check with the registration desk at the conference for the latest information.

PROFESSIONAL EDUCATION SEMINARS

SESSION I

Sunday, February 9, 9:30 AM – 1:00 PM

S.1 Switching Power Supply Design Basics
Marty Brown, Sierra Energy Management Systems
Fontainebleau A

This seminar is aimed at novice switching power supply designers who seek a further intuitive understanding of the design field. Information will be conveyed on the intuitive level with very few equations.

The content will include: how does a switching power supply differs from a linear power supply, description of how basic switching power supplies work, what are topologies and how does one know which is the right one for the application, designing or selecting some of the key components, what are losses and how does one identify them, feedback compensation, and descriptions of the new developments within the power field.

The outcome of attending this seminar will be a greater appreciation of the operation of switching power supplies and a basic knowledge of their design. A list of literature will show the attendee how to get more information involving the design and understanding of switching power supplies.

SEMINARS AT A GLANCE

TRACK	SESSION I SUNDAY, Feb. 9th 9:30am-1:00pm	SESSION II SUNDAY, Feb. 9th 2:30pm-6:00pm	SESSION III MONDAY, Feb. 10th 8:30am-12:00noon
Converter Circuits Fontainebleau A	**S.1 Switching Power Supply Design Basics** Marty Brown, Sierra Energy Management Systems	**S.6 Multiconverter Three-Phase Power Conversion Systems** Dorin O. Neacsu, Consultant	**S.11 Computer Aided Analysis and Design of Single Phase APFC Stages** Sam Ben-Yaakov, Ben-Gurion University of the Negev & Ilya Zeltser, Green Power Technologies
Control & Simulation Fontainebleau D	**S.2 Advanced Simulation of Power Electronics and Motor Drives using PSpice®** Michael Giesselmann, Texas Tech University	**S.7 Sensorless Current Mode Control: A Line-Disturbance-Immune Controller for dc to dc converters** Pallab Midya, Motorola Labs & Philip T. Krein, University of Illinois at Urbana Champaign	**S.12 A Primer on Simulation, Modeling, and Design of the Control Loops of Switching Regulators** Bob Erickson & Dragan Maksimovic, University of Colorado, Boulder
Semiconductors & Packaging Fontainebleau B	**S.3 MOSFET Avalanche Ratings Revisited** Marco Soldano, International Rectifier Corporation	**S.8 Power Packaging Techniques with Emphasis on High Current Applications** Douglas C. Hopkins, State University of New York - Buffalo	**S.13 Design Criteria for Modern Power Semiconductor Devices in AC/DC and DC/DC Converter Applications** Gerald Deboy, Joachim Krumrey, Dirk Ahlers & Ilia Zverev, Infineon Technologies
Drives & Vehicles Versailles Gallerie	**S.4 AC Electric Machines: Modeling and Control** David A. Torrey & James M. Kokernak, Advanced Energy Conversion	**S.9 Synthesis of Advanced Control Methodologies for High-Grade Adjustable Speed Motor Drives: Theory and Applications** Babak Fahimi, University of Missouri – Rolla & H. A. Toliyat, Texas A&M University	**S.14 Vehicular Power Electronics: Automotive and Aerospace Applications of Power Electronic Converters and Motor Drives** Mehrdad Ehsani, Texas A&M University & Ali Emadi, Illinois Institute of Technology
Magnetics & EMI Fontainebleau C	**S.5 EMC Enhanced Power Supply Design** Ernest H. Wittenbreder, Jr., Technical Witts	**S.10 Virtual Prototyping of Magnetic Components** Roberto Prieto & Pedro Alou, Technical University of Madrid	**S.15 Integrated Power Magnetics Design Techniques** Ed Bloom, e/j Bloom Associates

S.2 Advanced Simulation of Power Electronics and Motor Drives Using PSpice,
Michael Giesselmann, Texas Tech University
Fontainebleau D

Given the steady increase in available computational power in personal computers and advances in modeling software, modeling of power electronics and electric drives is fast becoming a viable design option for practicing engineers as well as for education and research.

PSpice has recently emerged as a excellent tool for the above mentioned applications due to its very powerful, nearly full capability evaluation version, its wide use in EE curricula throughout the country and its intuitive, easy to learn graphical interface. In addition there is widespread support on the Internet for PSpice models. More advanced users can upgrade to the full version. All popular versions of PSpice will be supported.

In this tutorial, we will specifically address modeling and simulations of power electronic converters and motor drives and provide ready to run examples (on a disk) that dramatically cut the lead-time for participants that want to generate their own simulations. Specific topics include Cycle-by-Cycle Averaged (CCA) Models for Converters in DC power supplies, Linearization, DC Motor Models and Drive Simulations, and AC-induction machines and Vector Control. No prior familiarity with PSpice is needed, however even advanced users will find useful information.

S.3 MOSFET Avalanche Ratings Revisited
Marco Soldano, International Rectifier Corporation
Fontainebleau B

One of the most intriguing features of modern Power MOSFETs is the capability to withstand some amount of avalanche energy, a condition that takes place when the maximum blocking voltage of the device is exceeded.

This rating has been changed and in some cases interpreted during the years by various manufacturers, leading to a certain level of confusion.

The purposes of this seminar are to give an overview to an entry level and intermediate audience on the failure models and mechanisms in the semiconductor device and to explain the different test circuits and rating methods used today providing a critical comparison.

A method for calculating the junction temperature rise is also shown, with numerical examples. The extension of the thermal approach to different 'in circuit' condition will be described.

Possible improvements of today's rating system will be proposed and discussed.

The last part will discuss the reliability implications of using the avalanche capability of MOSFETs in the design of switched mode power supplies.

S.4 AC Electric Machines: Modeling and Control
David A. Torrey & James M. Kokernak, Advanced Energy Conversion
Versailles Gallerie

Recent trends towards more efficient systems have extended from industrial to consumer to automotive technologies. A driving force in energy conservation is the implementation of efficient electric machines. Unfortunately, not all machine technologies are understood as well as others, such as the induction motor, which has maintained firm footing in most market segments. It can be argued that the lack of understanding surrounding many of these other machines may prevent a superior motor technology from being considered for a certain application. This seminar proposes to provide an introduction to various motor technologies, including induction, brushless dc, and permanent magnet synchronous, interior permanent magnet and switched reluctance machines. The seminar will discuss the structure and operation of these motor technologies, as well as provide insight to modeling and control techniques, giving the attendee the knowledge necessary make good decisions when selecting electric machines for their specific applications. As most of these motors require power electronics, issues associated with drive topology and control will be addressed.

S.5 EMC Enhanced Power Supply Design
Ernest H. Wittenbreder, Jr., Technical Witts
Fontainebleau C

The purpose of this course is to provide the power supply design engineer with a better understanding of the scientific and engineering principles of EMI generation, coupling mechanisms, EMI avoidance, and EMI reduction techniques and to provide the engineer with very specific information that he can use to accomplish low noise power supply designs. Several new circuit synthesis methods that can be used to form new power supply topologies with much improved EMC from standard well known topologies will be revealed. An exhaustive review of the many typical EMI problem areas is provided and proven methods are described to avoid those problem areas. PWB layout techniques and techniques applicable to construction, component design, circuit and component placement, shielding, and snubbing will be presented. The student will learn about EMI filter design, and EMI filter component and interface issues.

This course will be a benefit to all power supply engineers regardless of their levels of experience and ability.

PROFESSIONAL EDUCATION SEMINARS

SESSION II

Sunday, February 9, 2:30 – 6:00 PM

S.6 Multiconverter Three-Phase Power Conversion Systems
Dorin O. Neacsu, Consultant
Fontainebleau A

An alternative solution for medium power conversion consists of using paralleled and

interleaved power converters. Converter design can be therefore reduced to the use of low cost conventional IGBTs rated below 400A, 1200V with a series of additional advantages. This tutorial introduces parallel and interleaved three-phase medium power converters by a step-by-step learning procedure. First, details concerning hardware, current sharing,

active gate control and protection control for the simple parallel operation of IGBTs are shown. Comparative analysis of power losses for parallel and single use of IGBTs is given. Parallel inverter connection through small inductance follows naturally. Particular conditions of interleaving three-phase power converters when used as AC/DC or DC/AC converters are revealed along with definition of circulating currents, modeling approaches, selection of the proper PWM algorithm, small-signal design of the control loops, communication between blocks and synchronization methods. Final part of the presentation is dedicated to emerging topologies built of conventional three-phase voltage or current source converters and used to obtaining direct (matrix) power conversion systems. Their application to motor drives supplied from a three-phase grid is presented. Each step of the presentation is proven with simulation, computer-assisted analysis or experiments.

S.7 Sensorless Current Mode Control: A Line-Disturbance-Immune Controller for dc to dc Converters

Pallab Midya, Motorola Labs & Philip T. Krein, University of Illinois at Urbana Champaign
Fontainebleau D

Sensorless current mode (SCM) control is an observer method that provides the operating benefits of current mode control without current sensing. SCM has significant advan-tages over both conventional peak and average current-mode control techniques in noise suscepti-bility and dynamic range in both continuous mode and discontinuous mode. The method supports line and bulk load regulation, and reduces control complexity to a single loop. It also supports conventional two-loop control when tight load regulation is required. The properties make SCM suitable for a wide range of applications, such as dc drives, 42 V automotive converters, line-insensitive telecom power supplies, and many others. The framework of SCM encompasses one- cycle control as a special case, but the general SCM method is a public domain control technique. A small signal control analysis of SCM will be presented. The models will be used to show how SCM provides rejection of line disturbances and requires smaller controller gain than a two-loop current-mode controller of equal performance. Examples of SCM control circuits that use off-the-shelf PWM controller ICs will be also be presented. A basic understanding of PWM and dc to dc converters is the only prerequisite for the material.

S.8 Power Packaging Techniques with Emphasis on High Current Applications

Douglas C. Hopkins, State University of New York—Buffalo
Fontainebleau B

This seminar provides the power electronics designer with an in-depth description of leading and next-generation power packaging techniques useful in the physical design of power supplies and drives with emphasis on high current applications. The processes and attributes of packaging techniques, such as copper-on-ceramic, heavy copper on FR-4, bus-bar and molded interconnect will be given. Limitations of complementing processes commonly used with heavy metal techniques will also be given and is valuable as an introduction to other packaging techniques. The material is presented from both electrical and physical perspectives. The designer will gain familiarity with nomenclature, electrical and material characteristics, and guidelines for use of several packaging techniques. Designers will gain sufficient information to consider and select alternate packaging techniques that optimally meet their needs. Several product reviews will demonstrate electrical/physical design and identify critical packaging issues. This is an essential course for the designer who must look at other packaging design approaches to further shrink their electronics.

Level: Intermediate/advanced electrical design engineer.

S.9 Synthesis of Advanced Control Methodologies for High-Grade Adjustable Speed Motor Drives: Theory and Applications

Babak Fahimi, University of Missouri – Rolla & H. A. Toliyat, Texas A&M University
Versailles Gallerie

Adjustable speed motor drives are being increasingly integrated into high impact applications such as automotive products and aerospace equipments. These applications demand high-grade performance, reliability and fault tolerance from their respective motor drive components. To accommodate these vital needs, design and development of advanced control strategies for adjustable speed motor drives turns into a necessity.

This seminar intends to introduce design methodologies for classic and modern control strategies as applied to Induction, Brushless DC and Switched Reluctance Motor drives. Synthesis of classic closed loop systems, such as torque; speed and position control will be explained first. As the first step, design algorithms for implementation of advanced torque control such as scalar and vector control for induction and PM drives will be introduced. This part will also include optimal torque per ampere control for SRM drives. In the next step, we will explore design procedures using digital PI, IP, and Feedforward blocks for speed and position controls.

We will also introduce state-of-the-art in advanced control methodologies such as robust controllers, intelligent control, estimation and identification techniques and resilient control configurations. This seminar is designed for practicing engineers in industry and graduate level students in the field of adjustable speed motor drives.

S.10 Virtual Prototyping of Magnetic Components

Roberto Prieto & Pedro Alou, Technical University of Madrid
Fontainebleau C

This seminar will present a 'virtual' approach for the design of magnetic components using several numerical computation techniques and design tools. The goal of any 'virtual prototyping' procedure is to achieve an optimal design without time consuming build and test procedures. Attendees will gain insights into the scope of applications and the limitations of each tool and design approach (analytical or FEA based). Several design criteria will be analyzed. The "optimum" design concept and the way to obtain it will be discussed. Appropriate models for each design case will be examined.

Additionally, this seminar will present several industrial design examples where the importance of designing magnetic components from the point of view of the device itself and from the point of view of the circuit where the component is working will be highlighted. All the examples will be based on the most commonly applied topologies: Buck type inductors, Forward type transformers and Flyback type components.

The seminar is oriented to both, novice and experience designers. The idea is that novice designers can learn how to design inductors and transformers for common power converter topologies and experienced designers learn particular "interesting" design issues based on industrial examples.

PROFESSIONAL EDUCATION SEMINARS

SESSION III

Monday, February 10, 8:30 AM – 12:00 Noon

S.11 Computer Aided Analysis and Design of Single Phase APFC Stages

Sam Ben-Yaakov, Ben-Gurion University of the Negev & Ilya Zeltser, Green Power Technologies
Fontainebleau A

Average models that run on general purpose circuit simulators, can help to understand the large signal and small signal behavior of switch mode systems, and can assist in the design and trimming of the power stage and controller. The objective of the proposed seminar is to present a unified methodology for average modeling and simulation of Active Power Factor Correction (APFC) systems and to demonstrate its use in analysis and design.

The introductory part of the seminar covers the basics of the Generalized Switch Inductor Model (GSIM). In the following section, the seminar will introduce new behavioral models of APFC systems operating in continuous, discontinuous and borderline current modes. Both control methods with and without sensing of input voltage will be presented. It will be shown how these large signal models can be used, as is, to obtain the large signal as well as the small signal responses. The seminar will discuss in detail the application of the models in the analysis and design of APFC systems including the synthesis of phase compensation networks to meet bandwidth and phase margin requirements. This seminar is comprehensive and in-depth, intended for an intermediate audience.

S.12 A Primer on Simulation, Modeling, and Design of the Control Loops of Switching Regulators

Bob Erickson & Dragan Maksimovic,
University of Colorado, Boulder
Fontainebleau D

Attendees will learn how to model and simulate the small-signal transfer functions of PWM converters, and how to compensate their feedback loops. Voltage mode and peak current-mode control will be covered, in both continuous and discontinuous conduction modes, using techniques of design-oriented analysis. Damping of input EMI filters to avoid control loop interactions will also be covered. The concepts will be supported by numerous practical examples, including details of averaged simulations using Spice. The seminar will be presented at a basic to intermediate level. Knowledge of basic converter operation will be assumed.

S.13 Design criteria for modern power Semiconductor Devices in AC/DC and DC/DC Converter Applications

Gerald Deboy, Joachim Krumrey, Dirk Ahlers & Ilia Zverev, Infineon Technologies
Fontainebleau B

The seminar addresses the topics AC/DC power supplies and DC/DC converters in a system based approach. After a quick introduction of the AC to DC power chain of an SMPS it provides guidelines how to make the best of modern power semiconductor devices, which will be treated as key components for the system design. Special emphasis will be laid on high voltage MOSFETs e.g. compensation devices, fast recovery diodes e.g. SiC Schottky diodes and low voltage MOSFETs e.g. low gate charge and low on-state resistance devices with respect to their use in the PFC, PWM and buck converter stage.

Based on this device related introduction the seminar will discuss in a broad application section how to design in these components and which aspects like thermal considerations, safe operating area, hard switching or quasiresonant applications need special care.

The seminar is useful for system designers and addresses the above-mentioned topics on an entry to intermediate level.

S.14 Vehicular Power Electronics: Automotive and Aerospace Applications of Power Electronic Converters and Motor Drives

Mehrdad Ehsani, Texas A&M University & Ali Emadi, Illinois Institute of Technology
Versailles Gallerie

In this tutorial, we address fundamental issues in land, air, and space vehicular power systems. Furthermore, a brief description of the conventional vehicle electrical systems and the role of power electronics will be given.

The future vehicle electrical power systems will most likely be a single voltage bus (42V DC) with provision for hybrid and multi-voltage level distribution. Some of the loads considered are power steering, anti-lock braking, air-conditioning, throttle actuation, ride-height adjustment, rear-wheel steering, electrically heated catalyst, and active suspension systems.

Advanced aircraft and spacecraft power systems are also multi-converter power electronics based systems. In these systems, different converters such as AC/DC rectifiers, DC/DC choppers, and DC/AC inverters are used to provide power at different voltage levels in both DC and AC forms. Some of the loads considered are electro-mechanical and electro-hydraulic flight control actuators, 270V DC switched reluctance starter/generator, electric anti-icing, electro-mechanical valve control, air-conditioning system, utility actuators, weapon systems, and different electric motor drives for pumps and other applications.

This is an in-depth course for power electronics, motor drives, automotive, and aerospace electronics engineers and researchers at all levels.

S.15 Integrated Power Magnetics Design Techniques
Ed Bloom, e/j Bloom Associates
Fontainebleau C

One of the most interesting power magnetics design techniques currently being pursued by power electronics engineers today is the art of blending both transformer and energy storage inductances of switchmode converters together on SINGLE magnetic core structures. These unique magnetic systems are called integrated-magnetic (IM) components.

This APEC seminar has been structured to provide information on the most recent and detailed design aspects of IM power magnetic devices, as well as, IM applications not previously discussed in past APEC seminars. Included are structure suggestions for combining EMI filter magnetics with power factor stage inductances, new converter topologies wherein both input and output noise reduction filter inductances are combined with the power filter network and detailed design examples of coupled-inductor magnetic structures of the planar varieties. New multi-chambered IM core arrangements are also presented, along with a detailed design example of the their use in a forward converter arrangement preceded by an input filter network. The use of magnetic shunts, or reluctance disks, to enhance leakage inductances in coupled inductor IM devices is also a topic of this seminar.

This seminar is structured to provide in-depth coverage of the topic of integrated magnetics, and is intended for an audience of intermediate experience level.

RAP SESSIONS

Tuesday, February 11, 6:30 – 8:00 PM

Rap Session #1 • Power Supply "Digital Control"—Real or Virtual?
Moderator: Arnold N. Alderman, Anagenesis, Inc.
Fontainebleau A

What is your opinion about one of the most controversial issues in power supply design at the moment? Is it feasible for broad base use in power supplies or will it be a monument to engineering that nobody can afford? Will we get main switcher regulation control PLUS the other bells and whistles promised for that low expected price? Come on and hear the "experts: speak and share your unbiased opinion.

Rap Session #2 • Integration of Semiconductor components in Switching Power Supplies—Is Monolithic Power Module a Goal?
Moderator: Bharat S. Shah, President
BIAS Power Technology, Inc.
Fontainebleau B

Integration of power and control circuit has been going on for some time and the trend continues. Benefits and drawback of this from their perspective of switching power supply designer. Barriers to continue the integration. Can some

APEC 2003 Exhibitors

Allstar Magnetics
Alpha Electronics Corp.
Ametherm Inc.
Anderson Power Products
Ansoft Corporation
Aptronic
Artesyn Technologies
ASCOM
Ault Incorporated
Autotest
Bergquist Co.
Bi Technologies
Broadband Technologies
Cableco
Celestica
Ceramic Magnetics
Chang Sung Corporation
Chomerics
Chroma ATE Inc.
Coilcraft
Cooper Electronics
Cornell Dubilier
CTM Magnetics, Inc.
Curamik
Darnell
Datatronics
Dexter
EBG
ECI
ECN Magazine
Elcon
Eldre Corporation
Electrocube
Electronic Concepts
Electronic Products Magazine
Elna Ferrite
Environmental Potentials
Ericsson Microelectronics
ERM
eupec, Inc.
Fairchild Semiconductor
Fair-Rite
Ferroxcube
Fuji Semiconductor
Furukawa Electric and Wire
Future Technology
Evox Riva
HiTek Power Corporation
HV Components/CKE
High Voltage Power Systems
Infineon Technologies
International Rectifier
Intersil Corporation
Isotek Corporation
ITW Paktron
IXYS
Kaschke USA Inc.
Loctite
LEM
Lodestone
Magnetics
Magsoft
Methode
MH&W International
Micrel Semiconductor
Micrometals
Microsemi
MMG - NA
National Semiconductor
New England Electric Wire
NH Research
Nissei-Arcotronics
NORWE, Inc
Okaya Electric America, Inc.
Ohmite Manufacturing Compa
OPS--OnLine Power Supply
Paratronix Inc.
Payton America
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Popbridge Industsrial Limited
Positronic Industries
Powerex
Powersim Inc.
Primarion
R-Theta Inc.
RAF
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Spectrum Controls
Standex Electronics
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STMicroelectronics
Sumida
Supertex
Texas Instruments
Thermagon
Tocos America
Transim Technology
TSC
Tyco Power Systems
United Chemi-Con Corp.
VAC Corporation
Venable Industries
Voltage Multipliers

APEC 2003 — CONFERENCE AT A GLANCE

SATURDAY, February 8

Registration Desk Open		3:00 PM – 6:00 PM	Grand Gallerie

SUNDAY, February 9

Registration Desk Open		8:00 AM – 5:00 PM	Grand Gallerie
Seminar 1	Switching Power Supply Design Basics - Brown	9:30 AM – 1:00 PM	Fontainebleau A
Seminar 2	Advanced Simulation of Power Electronics and Motor Drives Using Pspice - Giesselmann	9:30 AM – 1:00 PM	Fontainebleau D
Seminar 3	MOSFET Avalanche Ratings Revisited - Soldano	9:30 AM – 1:00 PM	Fontainebleau B
Seminar 4	AC Electric Machines: Modeling and Control - Torrey	9:30 AM – 1:00 PM	Versailles Gallerie
Seminar 5	EMC Enhanced Power Supply Design - Wittenbreder	9:30 AM – 1:00 PM	Fontainebleau C
Seminar 6	Multiconverter Three-Phase Power Conversion Systems - Neacsu	2:30 PM – 6:00 PM	Fontainebleau A
Seminar 7	Sensorless Current Mode Control: A Line-Disturbance-Immune Controller for DC-DC Converters - Midya	2:30 PM – 6:00 PM	Fontainebleau D
Seminar 8	Power Packaging Techniques with Emphasis on High Current Applications - Hopkins	2:30 PM – 6:00 PM	Fontainebleau B
Seminar 9	Synthesis of Advanced Control Methodologies for High-Grade Adjustable Speed Motor Drives: Theory and Applications - Fahimi	2:30 PM – 6:00 PM	Versailles Gallerie
Seminar 10	Virtual Prototyping of Magnetic Components - Prieto	2:30 PM – 6:00 PM	Fontainebleau C

MONDAY, February 10

Registration Desk Open		8:00 AM – 3:00 PM	Grand Gallerie
Seminar 11	Computer Aided Analysis and Design of Single Phase APFC Stages - Ben-Yaakov	8:30 AM – 12:00 Noon	Fontainebleau A
Seminar 12	A Primer on Simulation, Modeling, and Design of the Control Loops of Switching Regulators - Erickson	8:30 AM – 12:00 Noon	Fontainebleau D
Seminar 13	Design Criteria for Modern Power Semiconductor Devices in AC-DC and DC-DC Converter Applications - Deboy	8:30 AM – 12:00 Noon	Fontainebleau B
Seminar 14	Vehicular Power Electronics: Automotive and Aerospace Applications of Power Electronic Converters and Motor Drives - Ehsani	8:30 AM – 12:00 Noon	Versailles Gallerie
Seminar 15	Integrated Power Magnetics Design Techniques - Bloom	8:30 AM – 12:00 Noon	Fontainebleau C
Session 1	Plenary Session	1:30 PM – 5:00 PM	Fontaine Room
Spouse & Guest Welcoming		8:30 AM – 9:30 AM	Imperial IV
Spouse & Guest Tour-Classic Miami		10:00 AM – 3:00 PM	Imperial IV
Exposition Hall Open		5:30 PM – 8:00 PM	Grand Ballroom
Micro Mouse Contest		8:00 PM – 10:00 PM	Fleur de Lis Room

TUESDAY, February 11

Registration Desk Open		8:00 AM – 3:00 PM	Grand Gallerie
Session 2	Inverters and Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 3	Hard Switched DC-DC Converters	8:30 AM – 12:00 Noon	Fontainebleau B
Session 4	Utility Interface	8:30 AM – 12:00 Noon	Fontainebleau C
Session 5	Meeting the Challenge – The New Market Reality	8:30 AM – 12:00 Noon	Fontainebleau D
Session 6	Three Phase Inverters	8:30 AM – 12:00 Noon	Versailles Gallerie
Spouse & Guest Tour -Miami Waterway		9:30 AM – 2:30 PM	Imperial IV
Exposition Hall Open		12:00 Noon – 6:30 PM	Grand Ballroom
Exhibitor Seminars	See Exposition Directory For Seminar Descriptions	2:00 PM – 5:30 PM	See Exposition Directory
Rap Session I		6:30 PM – 8:00 PM	Fontainebleau A
Rap Session II		6:30 PM – 8:00 PM	Fontainebleau B
Rap Session III		6:30 PM – 8:00 PM	Fontainebleau C

WEDNESDAY, February 12

Registration Desk Open	8:00 AM – 3:00 PM	Grand Gallerie	
Session 7	BLDC Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 8	DC-DC Converters – Control and Synchronous Rectification	8:30 AM – 12:00 Noon	Fontainebleau B
Session 9	Single Phase PFC	8:30 AM – 12:00 Noon	Fontainebleau C
Session 10	VRM General	8:30 AM – 12:00 Noon	Fontainebleau D
Session 11	Reliability, Analysis, EMI and Testing	8:30 AM – 12:00 Noon	Versailles Gallerie
Session 12A	Soft Switching Inverters	8:30 AM – 10:15 AM	French Rooms
Session 12B	Photovoltaic Converters	10:45 AM – 12:00 Noon	French Rooms
Session 13	PWM Techniques	2:00 PM – 5:30 PM	Fontainebleau A
Session 14	Soft-Switched, Low and Mid-Voltage DC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau B
Session 15	Single-Phase PFC and AC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau C
Session 16	VRM 12 Volt Input	2:00 PM – 5:30 PM	Fontainebleau D
Session 17	Components and Packaging	2:00 PM – 5:30 PM	Versailles Gallerie
Session 18	Power System Architectures	2:00 PM – 5:30 PM	French Rooms
Exposition Hall Open		12:00 Noon – 2:00 PM	Grand Ballroom
Conference Banquet		TBD – 10:00 PM	Lady Windridge

THURSDAY, February 13

Registration Desk Open	8:00 AM – 12:00 Noon	Grand Gallerie	
Session 19	Induction Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 20	Various Control Methods for DC-DC Converters	8:30 AM – 12:00 Noon	Fontainebleau B
Session 21	Power Quality	8:30 AM – 12:00 Noon	Fontainebleau C
Session 22	Semiconductors	8:30 AM – 12:00 Noon	Fontainebleau D
Session 23	Modeling, Simulation and Controls	8:30 AM – 12:00 Noon	Versailles Gallerie
Session 24A	Synchronous Motor Drives	2:00 PM – 3:45 PM	Fontainebleau A
Session 24B	Thermal Issues	4:15 PM – 5:30 PM	Fontainebleau A
Session 25	High Voltage Soft-Switched DC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau B
Session 26	Converters, Inverters and Circuits	2:00 PM – 5:30 PM	Fontainebleau C
Session 27	Magnetic Devices and Materials	2:00 PM – 5:30 PM	Fontainebleau D
Session 28	Lamp Ballasts	2:00 PM – 5:30 PM	Versailles Gallerie

magnetic components be integrated? What are the power limitations? Does this trend keep up with improvement in desired efficiency and power density?

Rap Session #3 • Bricks and SIPS—The Simple and Effective Power System Solutions for Tomorrow
Moderator: Walter Knittel, President
APtronic AG
Fontainebleau C

Today, we have available AC-DC bricks, DC-DC bricks and SIPS (e.g., VRMs and POLs). The designers and users of power systems demand low cost, high reliability, high efficiency, minimum space and flexibility to change the design to meet the changing market requirements. Bricks and SIPs are being used on the same board to meet the demanding requirements of the system designs.

EXHIBITION

EXHIBITION HOURS
The Exhibition, located in the Grand Ballroom on Level II of the Versailles Building, will be open as follows:

Monday, February 10 .....5:30 PM–8:00 PM
Tuesday, February 11 .....12:00 Noon–6:30 PM
Wednesday, February 12 .....12:00 Noon–2:00 PM

EXHIBITION DIRECTORY
The Exhibition Directory, which will be available at the conference, will give a complete listing of the Exhibitors, a map of the Exhibition Hall, details of the Exhibitor Seminars and other events in the Exhibition Hall.

EXHIBITOR SEMINARS
On the afternoon of Tuesday, February 11, from 2:00 PM until 5:30 PM, several of the companies participating in the Exhibition will offer technical seminars. Descriptions of the seminars will be listed in the Exhibition Directory, available at the conference.

EXHIBITOR'S RECEPTIONS
A Welcoming Reception will be held in the Exhibition Hall on Monday, February 10, from 5:30 PM until 8:00 PM. Join us for hors d'ouevres while visiting with the Exhibitors and other conference participants.

On Tuesday, light refreshments will be served during an Exhibitors' Reception from 5:00 PM until 6:30 PM.

Registered spouses and guests are welcome at these receptions.

EXHIBITION SURVEY & GIVEAWAY
To help the exhibitors and us continually improve the APEC Exposition, a survey is taken each year. Those who complete the survey form and return it no later than early on Tuesday afternoon are entered in a drawing for one of several fabulous prizes.

The drawing will take place in the Exhibition Hall about 6:15 PM on Tuesday, February 11 (right before the Rap Sessions) and you must be present to win!

EXHIBITION HALL LUNCHEONS
On Tuesday, February 11 and Wednesday, February 12, enjoy your lunch in the Exhibition Hall. Tickets are $10.00 each and are available through Advance Registration. Tickets may also be purchased at the Conference Registration Desk at least 24 hours in advance. The number of tickets is limited and may sell out. It is recommended that if you are interested in lunch in the Exhibition Hall that you buy them with your Advance Registration. Tickets will not be available at the luncheons.

Registered spouses and guests are welcome at the Exhibit Hall luncheons – ticket required, of course.

The exhibitors listed above were confirmed at the time of publication. Please check the Exhibition Directory at the conference for the most up-to-date listing of companies participating in the APEC Exhibition.

TECHNICAL SESSIONS

Session 1 **Monday, February 10**
Plenary **Fontaine Room**
1:30 PM – 5:00 PM

Session Chair: James Kokernak, Advanced Energy Conversion, LLC

1.1 Re-Defining Microprocessor Power Delivery
Lidow, A., International Rectifier

1.2 Scalable Data Center Architecture for On- Demand Power Infrastructure
Landsman, M., American Power Conversion

1.3 Towards EMI Prediction of a PM Motor Drive for Automotive Applications
Chen, S., Nehl, T., Pepa, E., Huang, X., De Doncker, R. & Voss, I., Delphi R&D

1.4 Power Electronics in Hybrid Electric Vehicle Applications
Miller, J., J-N-J Miller Design Services, P.L.C.

1.5 Revolutionary Advances in Distributed Power Systems
Lam, E., Bell, R. & Ashley, D., Power Management Group, National Semiconductor Corporation

1.6 Trends and Drivers in Board-Mount DC/DC converters
Sayani, M.P., Celestica Inc.

1.7 Integrated Packaging of a 1kW Switching Module Using Planar Interconnect on Embedded Power Chips Technology
Liang, Z., Lee, F., Van Wyk, J., Boroyevich, D., Scott, E, Chen, J., Lu, B., Pang, Y., Center for Power Electronics System

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Session 2 **Tuesday, February 11**
Inverters and Motor Drives **Fontainebleau A**
8:30 AM – 12:00 Noon

Session Chairs: Juan Balda, University of Arkansas & Fabio Crescimbini, University "Roma Tre"

2.1 A Novel Single-Stage Full-Bridge Buck-Boost Inverter
Wang, CM, Lunghwa University of Science & Technology

2.2 A New Maximum Power Point Tracking Controller for Photovoltaic Power Generation
Chen, Y., Vacher, F., Smedley, K., Department of Electrical & Computer Engineering, UC Irvine

2.3 A High-Frequency AC Distributed Power System with Dual PWM Buses
Mao, H. & Batarseh, I., University of Central Florida; Luo, S. & Hua, L., Tyco Electronics Power Systems Inc.

2.4 Model of Permanent Magnet Inductor Type Synchronous Motor
Yang, G., Harbin Institute of Technology

2.5 Closed Loop Control of Excitation Parameters for High Speed Switched-Reluctance Generators
Sozer, Y. & Torrey, D., Advanced Energy Conversion, LLC

2.6 Sensorless Position Control of Active Magnetic Bearings Based on High Frequency Signal Injection Method
Kim, J.H., Yim, J.S. & Sul, S.K., Seoul National University

2.7 Carrier Phase-Shifted SPWM Based Current-Source Multi-Converter
Xong, Y., Zhang, Y.H., Wei, K. & Zhang, Z.C., Electrical Engineering Dept. Zhejiang University

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Session 3 — **Tuesday, February 11**
Hard Switched Dc-Dc Converters — **Fontainebleau B**
8:30 AM – 12:00 PM

Session Chairs: Nathan Sokal, Design Automation, Inc. & Isaac Cohen, Lambda Electronics

3.1 Stand-Alone Photovoltaic Energy Storage System With Maximum Power Point Tracking
Pacheco, VM, Vieira Jr., JB, Freitas, LC, Coelho, EAA, Farias, VJ, Universidade Federal de Uberlia

3.2 Matrix Integrated Magnetics (MIM) for Low Voltage Interleaved DC-DC Converters
Charasekaran, S. & Mehrotra, V, Rockwell Scientific

3.3 High Performance Coupled-Inductor DC-DC Converters
Zhao, Q., Lee, F., Center for Power Electronics System

3.4 A Family of Buck-Type DC-DC Converters with an Autotransformer
Yao, K., Xu, M., Wei, J. & Lee, F.C, Virginia Polytechnic Institute & State University

3.5 Three-level Switching Cell for Low Voltage/High-Current DC-DC Converters with Fast Transient
Zhu, Y. & Lehman, B., Northeastern University

3.6 A Self-Boost Charge Pump Topology for a Gate Drive High-Side Power Supply
Park, S.H. & Jahns, T.M., University of Wisconsin - Madison

3.7 A 1MHz Hard-Switched SiC DC/DC Converter
Abou-Alfotouh, AM & Radun, AV, Electrical & Computer Engineering, University of Kentucky; Chang, HR, Power Electronics, Rockwell Science Center; Winterhalter, C., Capstone Turbine Corporation

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Session 4 — **Tuesday, February 11**
Utility Interface — **Fontainebleau C**
8:30 AM – 12:00 Noon

Session Chairs: Jason Lai, Virginia Tech University & Johan Kolar, Eth Zurich

4.1 A New Topology of Active Filter to Correct Power-Factor Compensate Harmonics Reactive Power and Unbalance of Three-Phase Four-Wire Loads
Singh, B. & Rastgoufard, P., Department of EECS, Tulane University

4.2 Operation of Unified Constant-frequency Integration Controlled Three-phase Active Power Filter with Unbalanced Load
Jin, T. & Smedley, K., Department of Electrical & Computer Engineering, UC Irvine

4.3 Implementation and Control of Grid Connected AC-DC-AC Power Converter for Variable Speed Wind Energy Conversion System
Song, S., Kang, S. & Jeong, S., Chonbuk National Univ.; Hahm, N., Intech-FA Co.

4.4 A Three-Phase Four-Wire Power Conditioner with Load-Dependent Voltage Regulation for Energy Saving
Chiang, S., Department of E.E., National Lien Ho Inst.

4.5 A New Three-Phase Harmonic-Free Rectification Scheme Based on Zero-Sequence Current Injection
Choi, SW, Seoul National Univ. of Tech.; Won, CY, Sungkyunkwan Univ., Kim, GS, Univ. of Seoul

4.6 A Novel Grid Synchronization Method without AC Line Voltage Sensors
Zhu, H., Arnet, B., Haines, L. & Shaffer, E., Solectria Corporation; Lai, J.S., Center for Power Electronics Systems, Virginia Tech

4.7 An Intelligent Control to Mitigate Voltage Flicker Utilizing DG Interface
El-Saadany, E. & Salama, M., University of Waterloo

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Session 5 — **Tuesday, February 11**
Meeting the Challenge – — **Fontainebleau D**
The New Market Reality — **8:30 AM – 12:00 PM**

Session Chairs: Bob White, Artesyn Technologies & Pietro Scalia, University of Palermo

5.1 A Proposed Analytical Framework for Market Research and Forecasting in the Power Supply Industry
Xu, F., Darnell Group

5.2 Power Electronics: From Electronic Plumbing to Business Enabler
Cheng, A., Gartner Dataquest

5.3 New Technical Marketing Research Methods? A Process for Achieving Focused Results
Kennedy, G., PEI Technologies; Alderman, A., Anagenesis, Inc.; Rinne, K., University of Limerick

5.4 The Power System Challenge - Understanding the Total Picture
Malik, R., IBM

5.5 Application of the Dell Direct Model to the AC Inverter Market
Piatt, J.E., Praestar Technology Corporation

5.6 Providing REAL Customer Satisfaction
Cormier, R., Power Systems Consulting

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Session 6 — **Tuesday, February 11**
Three Phase Inverters — **Versailles Gallerie**
8:30 AM – 12:00 Noon

Session Chairs: Russ Spyker, U.S. Air Force & Tim Haskew, University of Alabama

6.1 6kV/1800kVA Medium Voltage Drive with NPC Three-level Inverter Using IGCTs
Liu, WH, Song, Q., Xie, XR & Chen, YH, Department of Electrical Engineering, Tshinghua University

6.2 A Neutral-Point Potential Balancing Algorithm for Three-Level Neutral-Point-Clamped Voltage Source Inverters Using Analytically Injected Zero-Sequence Voltage
Liu, WH, Song, Q., Chen, YH & Wang, ZH, E.E Department, Tsinghua University

6.3 Genetic Algorithm Based Design of the Active Damping for a LCL-Filter Three-Phase Active Rectifier
Blaabjerg, F., IET Aalborg University; Liserre, M. & Dell'Aquila, A., DEE Politecnico di Bari

6.4 Comparative Evaluation of Reverse Blocking and Reverse Conducting IGBTs for Application in Three-Phase Indirect and Sparse Matrix Converter Systems
Schafmeister, F., Herold, S. & Kolar, J., ETH Zurich, Power Electronic Systems Laboratory

6.5 Current Control of 12-pulse Regenerative Converter for 20kA Magnetic Power Supply
Jeong, S.J. & Song, S.H., Chonbuk National University

6.6 Control Method for Cascaded H-Bridge Multilevel Inverter in Fault
Sanmin, W. & Bin, W., Ryerson University; Xudong, S. & Fahai, L., Tsinghua University

6.7 Cascade Multi-Level Converters with Sample-Time-Staggered Space Vector Modulation
Wang, L.Q., Huang, Y.S., Tang, K., & Zhang, Z.C., Zhejiang UniversityFontainebleau A

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Session 7 — **Wednesday, February 12**
BLDC Motor Drives — **Fontainebleau A**
8:30 AM – 12:00 Noon

Session Chairs: Thomas Hopkins, STMicroelectronics & Eric Persson, International Rectifier Corporation

7.1 A Supervisory Adaptive Fuzzy Variable Structure Speed Controller for Brushless DC Motor
Song, H.L., Yu, Y., Yang, M. & Xu, D.G, Harbin Institute of Technology

7.2 Generalized Design Methodology of Reduced Parts Converters for Low Cost BLDC Motor Drives
Lee, B.K. & Ehsani, M., Dept. of Electrical Engineering, Texas A&M University

7.3 A Novel SMC-Fuzzy Speed Controller for Permanent Magnet Brushless DC Motor
Song, H.L., Yu, Y., Yang, M. & Xu, D.G., Harbin Institute of Technology

7.4 BLDC Motor Full-Speed Operation Using Hybrid Sliding Mode Observer
Hao, L. & Toliyat, H., Texas A&M University

7.5 An Improved Current Control Method for Torque Improvement of High Speed BLDC Motor
Park, S-I, Kim, T-S, Ahn, S-C & Hyun, D-S, Dept. of Electrical Engineering, Hanyang University

7.6 Improved Direct Back EMF Detection for Sensorless Brushless DC (BLDC) Motor Drives
Shao, J., Nolan, D. & Hopkins, T., STMicroelectronics

7.7 Sensorless Control of the BLDC Motors From Near Zero to High Speed
Kim, TK, Lee, BL & Ehsani, ME, Texas A&M University

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Session 8 — **Wednesday, February 12**
Dc-Dc Converters – Control and Synchronous Rectification — **Fontainebleau B**
8:30 AM – 12:00 Noon

Session Chairs: Ada Cheng, Gartner Dataquist & Freddy Canizales, Alcatel Converters USA

8.1 Design and Control of Sensorless Current Mode dc-dc Converters
Mossoba, JT & Krein, PT, University of Illinois at Urbana-Champaign

8.2 Common Duty Ratio Control of Input Series Connected Modular DC-DC Converters with Active Input Voltage and Load Current Sharing
Giri, R. & Ayyanar, R., Arizona State University; Mohan, N., University of Minnesota

8.3 A DSP Based Controller for High-Power Interleaved Boost Converters
Huang, X., Nergaard, T. & Lai, J., Virginia Polytechnic Institute & State University; Xu, X., Ford Research Lab; Zhu, L., Ballard Power System Inc

8.4 Compensation for Step-Load Variations When Applying Synergetic Control
Monti, A., Dougal, R., Santi, E., Li, D. & Proddutur, K., University of South Carolina

8.5 Multi-Output Half-Bridge Converter with Single-Winding Self-Driven Synchronous Rectification
Visairo, H., CENIDET, Rodríguez, E., Instituto Tecnológico de Celaya; Alou, P. & Cobos, J.A, Universidad Politécnica de Madrid

8.6 An Improved Self-Driven Synchronous Rectification for a Resonant Reset Forward Converter
Xie, X.G., Zhang, J.M., Luo, G.Y., Jiao, D.Z. & Qian, Z.M., College of Electrical Engineering, Zhejiang University

8.7 New Self Driven Synchronous Rectification System for Converters with Symmetrically Driven Transformer
Fernandez, A., Sebastian, J., Herno, M.M., Villegas, P. & Garcia, J., Universidad de Oviedo

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Session 9
Single Phase PFC

Wednesday, February 12
Fontainebleau C
8:30 AM – 12:00 Noon

Session Chairs: Anatoly Shteynberg, Sipex Corp. & Schmuel Ben Yaakov, Ben Gurion University

9.1 Input Impedance Analysis of Single-Phase PFC Converters
Sun, J., Rensselaer Polytechnic Institute

9.2 Improving the Performance of PFC EMI Filters
Wang, S., Lee, F.C. & Odendaal, W.G., Virginia Polytechnic Institute & State University

9.3 Control of Multiple Single Phase PFC Modules with a Single Low-Cost DSP
Kim, S. & Enjeti, P., Texas A&M University

9.4 "Dead-Zone" Digital Controller for Improved Dynamic Response of Power Factor Preregulators
Prodic, A., Erickson, R. & Maksimovic, D., CoPEC - University of Colorado at Boulder

9.5 Sample Correction for Digitally Controlled Boost PFC Converters Operating in both CCM and DCM
De Gussemé, K., Van de Sype, DM, & Melkebeek, JAA, Ghent University

9.6 Duty-Ratio Feedforward for Digitally Controlled Boost PFC Converters
Van de Sype, DA, De Gusseme, K & Melkebeek, JA, Ghent University

9.7 A New Predictive Control Strategy for Power Factor Correction
Zhang, W., Feng, G., Liu, W. & Wu, B., Queen's University

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Session 10
VRM General

Wednesday, February 12
Fontainebleau D
8:30 AM – 12:00 Noon

Session Chairs: Bill Dillard, Auburn University & Richard Redl, ELFI S.A.

10.1 1MHz Multi-Resonant Push-Pull 48V VRM
Ye, M., Xu, M. & Lee, F., Virginia Polytechnic Institute & State University

10.2 A Novel Quasi-Resonant Phase-Shift Full Bridge for 48V Power Pod
Ren, Y., Xu, M., Meng, Y. & Lee, F., Virginia Polytechnic Institute & State University

10.3 Two-stage 48V Power Pod Exploration for 64-bit Microprocessor
Ren, Y., Xu, M., Yao, K., Yu, M., & Lee, F., Virginia Polytechnic Institute & State University

10.4 New DC/DC Converter With Low Output Voltage And Fast Transient Response
Barrado, A., Vázquez, R., Lázaro, A., Pleite, J., Vázquez, J. & Olías, E., Universidad Carlos III de Madrid

10.5 A Scalable Multiphase Buck Converter with Average Current Share Bus
Huang, W., Schuellein, G. & Clavette, D., International Rectifier Corporation

10.6 Time-Varying Current Observer with Parameter Estimation for Multiphase Low-Voltage/High-Current Voltage Regulator Modules
Luo, J., Pongratananukul, N. & Batarseh, I, University of Central Florida

10.7 Impact of Die Sensing on CPU Power Delivery
Koertzen, HW, Intel Corporation

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Session 11
Reliability, Analysis, EMI and Testing

Wednesday, February 12
Versailles Gallerie
8:30 AM – 12:00 Noon

Session Chairs: Mike Schutten, General Electric CR&D & Timothy Groat, Stored Energy Systems

11.1 Simulation of Industrial AC Drive System under Fault Conditions
Weatherford, HH, Georgetown Steel; Brice, CW, University of South Carolina

11.2 Ripple Current Cancellation Circuit
Schutten, M. & Steigerwald, R., GE Global Research Center

11.3 Novel High Reliable Power Electronics Systems Design Based on Bionics
LI, L. & He, H., College of Electrical Engineering, Zhejiang University

11.4 An Array-Based Study of Increased System Lifetime Probability
Nesgaard, C., Technical University of Denmark

11.5 An Improved EMI Filter Design Method for Switching Power Supplies
Ye, SY & Liu, YFL, Queen's University

11.6 Measurement-Based Characterization of IPEM Module
Yang, L., Lee, F.C. & Odendaal, W.G., Virginia Polytechnic Institute & State University

11.7 Active Power Sharing in Hybrid Battery/Capacitor Power Sources
Gao, L., Dougal, R. & Liu, S., University of South Carolina

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Session 12A — **Wednesday, February 12**
Soft Switching Inverters — **French Rooms**
10:45 AM – 12:00 Noon

Session Chair: David Torrey, Advanced Energy Conversion, LLC

12A.1 DSP Based Multiple Peak Power Tracking for Expandable Power System
Wu, W., Pongratananukul, N., Qiu, W., Rustom, K. & Batarseh, I., University of Central Florida; Kasemsan, S., Aerospace Corporation

12A.2 Independently Sourced Parallel-Connected Power Systems with Maximum Power Tracking
Siri, K. & Conner, K., The Aerospace Corporation

12A.3 An Improved MPP Tracking Converter using Current Compensation Method for Small Scaled PV-Applications
HyeongJu, N., Dongyun, L. & Dongseok, H., Dept. of Electrical Engineering, Hanyang University

12A.4 A Single-Phase Three-Wire Grid-Connection PV Power Inverter with APF Based on Nonlinear Programming and FZPD Algorithm
Wu, T-F, Shen, C-L, Nei, H-S & Chiu, J-Y, National Chung Cheng University

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Session 12B — **Wednesday, February 12**
Soft Switching Inverters — **French Rooms**
8:30 AM – 10:15 AM

Session Chair: Mark Nelms, Auburn University

12B.1 A Soft Switching Inverter Module with Modified DC-link Circuit for High Frequency DC-AC Power Conversion
Shireen, W., University of Houston

12B.2 A New Control Method for High Frequency Link Inverter Design
Songquan, D., Mazumdar, J.& Batarseh, I., University of Central Florida

12B.3 IGBT Device Application Aspects for 50-kW Zero-Current-Transition Inverters
Li, Y., International Rectifier Corporation; Lee, F. & Boroyevich, D., Center for Power Electronics Systems, Tech

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Session 13 — **Wednesday, February 12**
PWM Techniques — **Fontainebleau A**
2 PM – 3:45 PM

Session Chairs: Herb Hess, US Army CSCOM & Agelidis Vassilios

13.1 Modified Low Switching Frequency Space Vector Modulators For High Power Multi-Module Converters
Bakhshai, A.R. & Saeedifard, M., Isfahan University of Technology; Joos, G., Concordia University; Jain, P., Queens University

13.2 A General Voltage Space Vector PWM Control Algorithm for Multilevel Inverter Based on Line-to-Line Voltage
Sanmin, W. & Bin, W., Dept.of ECE, Ryerson University; Fahai, L. & Congwei, L., Dept.EE, Tsinghua University

13.3 Space Vector Based Bus Clamped PWM Algorithms for Three Level Inverter Fed A.C. Drives: Implementation Performance Analysis and Application Considerations
Beig, A.R. & Ranganathan, V.T., IISc Bangalore

13.4 A Reduced Common Mode Hysteresis Current Regulation Strategy for Multilevel Inverters
Loh, PC & Holmes, DG, Monash University; Fukuta, Y. & Lipo, TA, University of Wisconsin-Madison

13.5 Design of Space Vector-Based Hybrid PWM Techniques for Reduced Current Ripple
Krishnamurthy, H., Gopalaratnam, N. & Ayyanar, R., Arizona State University; Ranganathan, V.T., Indian Institute of Science

13.6 Elimination of Harmonics in a Multilevel Converter with Non Equal DC Sources
Tolbert, LT, Chiasson, J., McKenzie, K. & Du, Z., University of Tennessee

13.7 A Complete Solution to the Harmonic Elimination Problem
Chiasson, J., Tolbert, L., McKenzie, K. & Du, Z., ECE Dept, University of Tennessee

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Session 14 — **Wednesday, February 12**
Soft-Switched, Low and Mid-Voltage Dc-Dc Converters — **Fontainebleau B**
2:00 – 5:30 PM

Session Chairs: John Bassett, Artesyn Technologies & Dragan Maksimovic, University of Colorado

14.1 Over Current Protection Methods for LLC Resonant Converter
Yang, B. & Lee, FC, Center for Power Electronics Systems; Concannon, M., Eltek Energy

14.2 A Low Output Ripple DC to DC Converter Topology Using Voltage Overlapping Technique
Liu, CP, Poon, NK & Pong, MH, The University of Hong Kong

14.3 Magnetic-less Converter Based on Piezoelectric Transformers for Step-Down DC/DC and Low Power Application
Sanz, M., Alou, P., Prieto, R., Cobos, J.A. & Uceda, J., Universidad Politecnica de Madrid

14.4 A New Family of Full Bridge ZVS Converters
Jang, Y. & Jovanovic, M., Delta Products Corporation

14.5 A New Duty-Cycle-Shifted PWM Control Scheme for Half-Bridge DC-DC Converters to Achieve Zero-Voltage-Switching
Mao, H., Abu Qahouq, J. & Batarseh, I., University of Central Florida

14.6 New Zero-Voltage-Switching Half-Bridge DC-DC Converter and PWM Control Method
Mao, H., Abu Qahouq, J.& Batarseh, I., University of Central Florida

14.7 A PWM Plus Phase-Shift Control Bidirectional DC-DC Converter
Zhao, C.H., Fan, H.F., Chen, G. & Xu, D.H., Department of Electrical Engineering, Zhejiang University

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Session 15 — **Wednesday, February 12**
Single-Phase PFC and Ac-Dc Converters — **Fontainebleau C**
2 PM – 5:30 PM

Session Chairs: Michael A. E. Andersen, Technical University of Denmark & Ashoka Bhat, University of Victoria

15.1 Performance Evaluation of CoolMOSTM and SiC Diode for Single-Phase Power Factor Correction Applications
Dong, W., Zhao, Q. & Lee, F.C., Virginia Tech

15.2 A Passive Clamp Circuit for BIFRED Converter
Tuomainen, V., Helsinki University of Technology; Tuomainen, V., Institute of Intelligent Power Electronics

15.3 Reduction of Voltage Stresses in Buck-Boost-Type Power Factor Correctors Operating in Boundary Conduction Mode
Petersen, L., Technical University of Denmark; Erickson, R., Colorado Power Electronics Center

15.4 Switching Frequency Related Trade Off's in a Hard Switching CCM PFC Boost Convert
Zverev, I., Infineon Technologies AG

15.5 A Flexible and Low Cost Design for Flyback AC/DC Converter with Harmonic Current Correction
Chang, C. & Liu, L., National Chiao Tung University

15.6 A ZVS Approach for AC/DC Converter with PFC
Poon, NK, Liu, CP & Pong, MH, Hong Kong University

15.7 Design of a Multilevel Front-End Stage for Traction Systems with the Passivity Theory
Dell'Aquila, A., Liserre, M. & Monopoli, V., Politecnico di Bari; Cecati, C., Università di L'Aquila

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Session 16 — **Wednesday, February 12**
VRM 12 Volt Input — **Fontainebleau D**
2:00 PM – 5:30 PM,

Session Chairs: Conor Quinn, Artesyn Technologies & Jose Cobos, Universidad Politecnica de Madrid

16.1 High Frequency DC:DC Power Conversion: The Influence of Package Parasitics
Pavier, M., Sawle, A., Sting, M., Woodworth, A. & Blake, C., International Rectifier;

16.2 Improvement of Transient Response in High-Current Output DC-DC Converters
Hirokawa, MH & Miyazaki, HM, TDK R&D Corporation; Matsuura, KM, TDK Corporation; Ninomiya, TN, Kyushu University

16.3 Analysis of the Buck Converter for Scaling the Supply Voltage of Digital Circuits
Soto, A., De Castro, A., Alou, P., Cobos, J.A & Uceda, J., Universidad Politécnica de Madrid

16.4 Optimal Design of the Active Droop Control Method for Transient Response
Yao, K., Meng, Y. & Lee, F.C., Virginia Polytechnic Institute & State University

16.5 A Novel Soft-Switched High-Frequency High-Efficiency High-Current 12V Voltage Regulator --- Phase-Shift Buck Converter
Wei, J. & Lee, F., Virginia Polytechnic Institute & State University

16.6 System Accuracy Analysis of the Multiphase Voltage Regulator Module
Huang, W., Clavette, D., Schuellein, G. & Crowther, M., International Rectifier Corporation

16.7 A Novel Control Method for Multiphase Voltage Regulators
Yao, K., Lee, K., Zhang, X. & Lee, F.C., Virginia Polytechnic Institute & State University

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Session 17 — **Wednesday, February 12**
Components and Packaging — **Versailles Gallerie**
2:00 PM – 5:30 PM

Session Chairs: Frank Cirolia, Ascom Energy Systems, Inc. & Doug Hopkins, State University of New York

17.1 High Performance Low Impedance Power Interconnects
Wood, D., Tyco Electronics, Elcon Power Connector Products Group

17.2 Power Connector Parameter Analysis by 2D
Wang, S., Lee, F.C. & Odendaal, W.G., Virginia Polytechnic Institute & State University

17.3 A Novel Rapid Charger of Lead-Acid Batteries with Energy Recovery
Chiu, H., Chung-Yuan Christian University; Pan, P. & Yeh, W., I-Shou University

17.4 A Novel Economical Single Stage Battery Charger with Power Factor Correction
Sasic, B., Marshall, J. & Tomasiewicz, S., Curtis Instruments, Inc.

17.5 Reduce Capacitor Count 50% in Bus-Capacitor Arrays Using New Electrolyte
Macomber, L L, Cornell Dubilier

17.6 Power Supply with High Insulation Capability to Feed Electronics on the High Potential Side in Power Distribution Networks
Heinemann, L., ABB Calor Emag High Voltage Switchgears; Mast, J. & Scheible, G., ABB Corporate Research Center

17.7 Integrating Magnetoresistive Current and Thermal Sensors in Power Electronic Modules
Olson, E., Park, S. & Lorenz, R.D., University of Wisconsin, Madison

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Session 18 — **Wednesday, February 12**
Power System Architectures — **French Rooms**
2:00 PM – 3:45 PM

Session Chairs: Lars Thorsell, Ericsson Microelectronics AB & James Williams, The Boeing Company

18.1 Analyzing and Determining Optimum On-Board Power Architectures for 48Vin Systems
Sayani, M.P. & Wanes, J., Celestica Inc.

18.2 Technical Risk and Economic Factors in Telecom Board-Mounted Power Design
Wojtasik, A. & Skoglund, B.E., Ericsson Power Moduls

18.3 Elimination of Numerical Oscillations in Power System Dynamic Simulation
Gao, W., Solodovnik, E., Dougal, R. & Cokkinides, G., University of South Carolina; Meliopoulos, S., Georgia Institute of Technology

18.4 A 30V/1MHz AC/AC Converter for High Frequency AC Distributed Power System Applications
Zhang, J.M., Xie, X.G. & Qian, Z.M., College of Electrical Engineering, Zhejiang University

18.5 Emerging On-Board Power Architectures
White, R., Artesyn Technologies

18.6 Three Phase Active Harmonic Rectifier (AHR) to Improve Utility Input Current THD in Telecommunication Power Distribution System
Kim, S., Harfman, M. & Enjeti, P., Texas A&M University

18.7 Design Guidelines for Surface Mount Power Converters
Flannery, J., Artesyn Technologies

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Session 19 — **Thursday, February 13**
Induction Motor Drives — **Fontainebleau A**
8:30 AM - 12 Noon

Session Chairs: Babak Fahimi, University of Missouri-Rolla & Tim Lewis, United Defense LP

19.1 A Novel Quasi-Resonant Inverter for High Performance Induction Motor Drives
Behera, S., Das, S.P. & Doradla, S.R., Indian Institute of Technology, Kanpur

19.2 A Five-Level Inverter Voltage Space Phasor Generation for an Open-end Winding Induction Motor Drive
Baiju, M.R., Somasekhar, V.T., Gopakumar, K. & Uman, L., Indian Institute of science

19.3 Optimal Low Switching Frequency Modulation of a Front-End Inverter Feeding Induction Motors
Attaianese, C. & Tomasso, C., University of Cassino

19.4 Robust Sensorless Speed Controller Design for SFO System of Induction Motor
Kim, D.I., Shin, M.H. & Hyun, D.S., Hanyang University

19.5 Experimental Results of the Current-Source PWM Inverter Fed Induction Motor Drive with an Open-Loop Stator Current Control
Salo, M. & Tuusa, H., Tampere University of Technology

19.6 Terminal Voltage Control of a Wind Turbine Driven Isolated Induction Generator
Seyoum, D., Rahman, F. & Grantham, C., University of New South Wales

19.7 Low-Cost SCR-Based Premium Power Quality Variable Speed Drive Technology
Hammell, D., Holveck, M., Lerch, J. & Limpaecher, E., Princeton Power System

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Session 20 — **Thursday, February 13**
Various Control Methods for Dc-Dc Converters — **Fontainebleau B**
8:30 AM – 12:00 Noon

Session Chairs: Van Niemela, Fairchild Semiconductor & Tom Nath, Intel Corporation

20.1 Control Loop Design for Two-Stage DC-DC Converters with Low Voltage/High Current Output
Zhu, Y. & Lehman, B., Northeastern University

20.2 Digital Controller Chip Set For Isolated DC-DC Power Supplies
Prodic, A., Erickson, R.W. & Maksimovic, D., CoPEC - University of Colorado at Boulder

20.3 A Detailed Analysis of a Resonant Gate Driver for PWM Applications
Lopez, T., Duerbaum, T., Sauerlaender, G. & Tolle, T., Philips Research Laboratories

20.4 Isolated Two-Inductor Boost Converter with One Magnetic Core
Yan, L. & Lehman, B., Northeastern University

20.5 Design Comparisons Between Primary Side Control and Secondary Control Using Peak Current Mode Controlled Active Clamp Forward Topology
Hua, L., Wang, T.G. & Luo, S., Tyco Electronics/Power System; Li, H., Florida State University

20.6 Self-driven Constant Voltage Reset Circuit
Jitaru, I., Ascom Rompower Inc.

20.7 A Simple Design for Paralleling Current-Mode Controlled DC-DC Converters
Li, P. & Lehman, B., Northeastern University

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Session 21 **Thursday, February 13**
Power Quality **Fontainebleau C**
8:30 AM – 12:00 Noon

Session Chairs: Dan Chen, Virginia Polytechnic Institute and State University & Dusan Graovac, Baldor ASR Gimgh-Entwicklung

21.1 A Reduced Rating Active Power Filter to Suppress Neutral Current Harmonics in Three-Phase Four-Wire Systems
Choi, SW & Jang, MS, Seoul National University of Technology

21.2 A Suitable Control Strategy for Integrated Active Power Filter and VAR Compensator for Unbalanced Conditions of the Power Mains.
L. A. Ribeiro, R., B. Jacobina, C., R. C. Da Silva, E., M. N. Lima, A., LEIAM-DEE-UFPB-Brazil; L. A. Ribeiro, R., DEE-CEFET-MA-Brazil; Profumo, F., Pennetta, G., DIEI-Politecnico di Torino-Italy

21.3 Impedance Emulation Method for a Single Phase Shunt Active Filter
Chattopadhyay, S., Rajaganesh, K. & Ramanarayanan, V., Indian Institute of Science

21.4 Design and Analysis of a Grid Interface with Neutral Pint Control Based on an Interleaved Three-Phase Power Converter System
Neacsu, D., Borowy, B. & Lovelace, E., Satcon Technology Corporation

21.5 Direct Power Control for Three-Phase PWM Rectifier with Active Filtering Function
Mariusz Cichowlas, Mariusz Malinowski, Marian Kazmierkowski, Warsaw University of Technology Institute of Control & Indust; Frede Blaabjerg, Aalborg University Institute of Energy Technology

21.6 A Novel Configuration of Unified Power Flow Controller
Peng, F.Z. & Wang, J., Department of Electric & Computer Engineering, MSU

21.7 A Hybrid Voltage Amplifier for Power Calibrator with Harmonic Analysis Capability
Lavric, H, Nastran, J., University of Ljubljana

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Session 22 **Thursday, February 13**
Semiconductors **Fontainebleau D**
8:30 AM – 12:00 Noon

Session Chairs: Alex Craig, Fairchild Semiconductor & Arnold Alderman, International Rectifier

22.1 Trench Gate IGBTs for Zero Current Switching Applications
de Silva, M., Shrestha, N., Azar, R., Palmer, P., Udrea, F. & Amaratunga, G., University of Cambridge; Chamund, D., Coulbeck, L. & Waind, P., Dynex Semiconductors

22.2 State-of-the-Art Low Voltage and High Voltage IGBTs in Soft Switching Operation
Bernet, S., University of Technology Berlin; Teichmann, R., Dresden University of Technology; Luescher, M., ABB Semiconductor AG

22.3 Parameter Extraction for a Physics-Based Circuit Simulator IGBT Model
Kang, X., Santi, E. & Hudgins, J.L, University of South Carolina; Palmer, P., University of Cambridge

22.4 A New SMPS Non Punch Thru IGBT Replace MOSFET in SMPS High Frequency Applications
Soldano, M. & Francis, R., International Rectifiers Corp.

22.5 De-Embedding Of Reverse Recovery Losses In Fast Switching VRM Applications
Tolle, T., Duerbaum, T. & Elferich, R., Philips Research Laboratories

22.6 A Novel Si1-xGex/Si Hetero-junction Power Diode for the Fast-Switching and the Soft Recovery
Qi, H., Gao, Y. & Zhang, R.L., Dept. Electronics Engineering, Xi'an University of Technology

22.7 A Gate Driver Based Soft-Switching SiC Bipolar Junction Transistor
Yu, H. & Lai, J., CPES, Virginia Tech; Zhang, J., Hu, X. & Zhao, J., SiCLAB, ECE Department, Rutgers University

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Session 23 **Thursday, February 13**
Modeling, Simulation and Controls **Versailles Gallerie**
8:30 AM – 12:00 Noon

Session Chairs: Phil Krein, University of Illinois at Urbana-Champain & Enrico Santi, University of South Carolina

23.1 Small-Signal Model of Variable-Frequency Flyback Converter
Irving, B.T., Panov, Y. & Jovanovic, M.M., Power Electronics Laboratory, Delta Products Corporation

23.2 An Adaptive Current Mode Fuzzy Logic Controller for DC-to-DC Converters
Feng, G., Zhang, W.F. & Liu, Y.F., Department of Electrical & Computer Engineering, Queens University

23.3 Digital Control of a Boost Converter Using Posicast
Feng, Qi, Hung, J.Y. & Nelms, R.M., Electrical & Computer Engineering Department, Auburn University

23.4 Instruction Set Modeling of Micro-Controllers for Power Converter Simulation
Elias, N.J., Philips Research

23.5 Large-Signal Model of a Downstream DC/DC Converter for Analysis and Design of Front-End PFC Rectifier Using Computer Simulation
Liu, J., Xi'an Jiaotong University; Wilson, TG, Wunderlich, R. & Wong, RC, Transim Technology Corporation; Lee, FC, Virginia Polytechnic Institute & State University

23.6 Frequency Response Analysis for DC-DC Converters Without Small-Signal Linearization
Siri, K., Electrical & Electronic Systems Dept., The Aerospace Corporation; Ly, J., Control Systems Dept., The Aerospace Corporation

23.7 A Transient Prediction and Stability Analysis Tool for DC-DC Converters
Gezgin, C., Tyco Electronics Power Systems

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Session 24A — **Thursday, February 13**
Thermal Issues — **Fontainebleau A**
4:15 PM – 5:30 PM

Session Chair: Dennis Gregory, Condor DC Power Supplies, Inc.

24A.1 Fast Thermal Profiling of Power Semiconductor Devices Using Fourier Techniques
Nelson, J., Venkataramanan, G. & EL-Refaie, A., University of Wisconsin-Madison

24A.2 Teaching Thermal Design of Power Electronic Systems with Web-Based Interactive Educational Software
Drofenik, U. & Kolar, J.W., Swiss Federal Institute of Technology Zurich

24A.3 Characterization of Mixed Metals Swaged Heat Sinks
Zaghlol, AM, R-Theta Inc.; Leonard, W. & Culham, RJ, University of Waterloo

24A.4 An Iteractive Approach for Integrated Electro-Thermal Design of a Distributed Power Supply Systems Module
Sang, T., Wu, Y., Odendaal, W.G., Lee, F.C. & Bohn, J.H., Virginia Tech

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Session 24B — **Thursday, February 13**
Synchronous Motor Drives — **Fontainebleau A**
2:00 PM – 3:45 PM

Session Chair: Rakesh Dhawan, Wavecrest Laboratories

24B.1 Robust Current Control and Commutation Tuning for an IPMSM Drive
C. J. Liaw & C. M. Liaw, Department of EE, National Tsing Hua University; H. C. Chen & Y. C. Chang, Compressors Department, ERL/ITRI

24B.2 Quantitative Digital Positioning Control for Linear Motor Drive
Su, WT & Liaw, CM, Department of EE, National Tsing Hua University

24B.3 An Inertia Identification Using ROELO for Low Speed Control of Electric Machine
Lee, K.B. & Yoo, J.Y., Korea University; Song, J.H. & Choy, I., KIST

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Session 25 — **Thursday, February 13**
High Voltage Soft-Switched Dc-Dc Converters — **Fontainebleau B**
2:00 PM – 5:30 PM

Session Chairs: Chuck Mullett, ON Semiconductor & Bob Steigerwald, General Electric CR&D

25.1 A New Three-Level Soft-Switched Converter
Jang, Y. & Jovanovic, M., Delta Products Corporation

25.2 High Insulation Multiple Output Switch Power Supply Used for Driving of IGBTs in Medium-High Voltage Inverter
Wanmin, Fei, Zhengyu, Lu, Linghui, Xia & Zhaolin, Wu, College of Electrical Engineering, Zhejiang University

25.3 Study and Application of an Innovating Structure of Converter: Sparc - Serial and Parallel Auto Regulated Configuration
Thierry Lequeu, Bessam Khelif & Didier Magnon, Microelectronics Power Laboratory; Philippe Aubin & Gérard Kalvelage, Faiveley Transport

25.4 The Zero-Voltage Switching(ZVS) Critical Conduction Mode(CRM) Buck Converter with Tapped-Inductor
Park, J.H. & Cho, B.H., Seoul National University

25.5 Input Voltage Modulated High Voltage DC Power Supply Topology for Pulsed Load Applications
Vishwanathan, N. & Ramanarayanan, V., Indian Institute of Science

25.6 Transformer Secondary Leakage Inductance Based ZVS Dual Bridge DC/DC Converter
Chen, Min, Luo, Ma, Lou, J.S. & Xu, D.H., Department of Electrical Engineering, Zhejiang University

25.7 A Novel Zero-Voltage and Zero-Current-Switching Full-Bridge PWM Converter
Song, TT, Huang, NC, Huang, S, Liu, GL & Zhang, DR, Department of Electrical Engineering, Sichuan University

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Session 26 — **Thursday, February 13**
Converters, Inverters and Circuits — **Fontainebleau C**
2:00 PM – 5:30 PM

Session Chairs: Dorin Neacsu, Satcon Technology Corporation & Jaime Arau, CENIDET

26.1 A Combined Front End DC/DC Converter
Xing, Y., Huang, L. & Cai, X., Dept.of Electrical Engineering, Tsinghua University; Sun, S., Power Electronics Lab(Beijing), Lite-On Electronics

26.2 Comparison Among ZVS Isolated PWM DC-DC Converters
Baggio, JE, Hey, HL, Gründling, HA, Pinheiro, H & Pinheiro, JR, Federal University of Santa Maria

26.3 High-Voltage High-Power Resonant Converter for Electrostatic Precipitators
Zheng, S. & Czarkowski, D., Dept. of ECE, Polytechnic University

26.4 MATLAB Based Simulation of Three-level PWM Inverter-fed Motor Speed Control System
Xie, X., Yan, G., Chen, Y. & Liu, W., Tsinghua University

26.5 Supervisory Control of a HV Integrated Starter-Alternator with Ultracapacitor Support Within the 42 V Automotive Electrical System
Spillane, D., O'Sullivan, D., Egan, MG & Hayes, JG, PEI Technologies, Dept. of EEE, UCC

26.6 A Multilevel Inverter Topology for Inductive Power Transfer
Rodriguez, JI & Leeb, SB, Laboratory for Electromagnetic & Electronic Systems, M.I.T.

26.7 Control Design and Testing of a Novel Fuel-Cell-Powered Battery-Charging Station
Jiang, Z. & Dougal, R., University of South Carolina

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Session 27 **Thursday, February 13**
Magnetic Devices and Materials **Fontainebleau D**
2:00 PM – 5:30 PM

Session Chairs: Glenn Skutt, VPT, Inc. & Khai Ngo, University of Florida

27.1 Integration of Electromagnetic Passive Components in DPS Front-End DC/DC Converter C A Comparative Study of Different Integration Steps
Chen, R., Canales, F., Yang, B., Barbosa, P., van Wyk, JD & Lee, FC, Center for Power Electronic System (CPES), Virginia Tech

27.2 Magnetic Integration for Interleaved Converters
Zumel, P., García, O., Cobos, J. & Uceda, J., Universidad Politecnica de Madrid

27.3 Inductance Characterization of a High-Leakage Transformer
Hayes, JG, University College

27.4 Easy-To-Use CAD Tools for Litz-Wire Winding Optimization
Abdallah, TA, Pollock, JD & Sullivan, CR, Thayer School of Engineering, Dartmouth College

27.5 Optimal Core Dimensional Ratios for Minimizing Winding Loss in High-Frequency Gapped-Inductor Windings
Jensen, RA & Sullivan, CR, Thayer School of Engineering, Dartmouth College

27.6 Analysis and Design Optimization of Front End Passive Components for Voltage Source Inverters
Chen, G., Rentzsch, M., Wang, F., Ragon, S., Stefanovic, V. & Boroyevich, D., Virginia Tech

27.7 Low Profile Transformers and Modules Using Low Temperature Co-Fire Magnetic Tape
Bielawski, J.C. & Slama, G., Midcom, Inc; Wahlers, R.L., Feingold, A.H., Huang, C.Y. & Heinz, M.R., Electro Science Laboratories

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Session 28 **Thursday, February 13**
Lamp Ballasts **Versailles Gallerie**
2:00 PM – 5:30 PM

Session Chairs: Bill Peterson, E&M Power & J.C. Johnson, Cooper Lighting

28.1 Arc Stabilization in Low-Frequency Square-Wave Electronic Ballasts for Metal Halide Lamps
Ribas, J., Alonso, JM, Calleja, AJ, Corominas, EL, Cardesin, J., Garcia, J. & Rico-Secades, M., University of Oviedo

28.2 A Single-Stage Electronic Ballast with Emergency Lighting Features
Chen, Y.K., National Huwei Institute of Technology; Wu, Y.C., I-Shou University; Wu, T.F. & Wu, Y.E., National Chung Cheng University

28.3 A New Proposal of Soft-Commutated Power Oscillator that can be Applied as an Electronic Ballast for Fluorescent Lamps
Romualdo da Silva Vincenzi, F., Gomes de Freitas, L.C., Prado da Silva, É., Antônio Alves Coelho, E., Farias, V.J, Vieira Jr., J.B & Carlos de Freitas, Universidade Federal de Uberlândia

28.4 A High Power Factor Electronic Ballast with a Single Switch and a Single Power Stage
Vilela Jr, J.A., Vaz, A.R., Farias, V.J., Freitas, L.C., Coelho, E.A. & Vieira Jr, J.B., University Federal of Uberl&ia

28.5 Design and Performance of Digital Ballast for HPS Lamps
Zhang, W.Q. & Xu, D.G., Dept. of Electrical Engineering, Harbin Institute of Technology

28.6 LCLC Resonant Converter for Multiple Lamp Operation Ballast
Liu, C.Y., Teng, F.H., Hu, C.S. & Zhang, Z.C., Zhejiang University

28.7 Design of LCpCs Resonant Inverters as a Power Source for HPS Lamp Ballast Applications
Branas, C.H., Azcondo, F.J. & Bracho, S., University of Cantabria

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Saturday, February 8			
Registration Desk Open		3:00 PM – 6:00 PM	Grand Gallerie
Sunday, February 9			
Registration Desk Open		8:00 AM – 5:00 PM	Grand Gallerie
Seminar 1	Switching Power Supply Design Basics - Brown	9:30 AM – 1:00 PM	Fontainebleau A
Seminar 2	Advanced Simulation of Power Electronics and Motor Drives Using Pspice - Giesselmann	9:30 AM – 1:00 PM	Fontainebleau D
Seminar 3	MOSFET Avalanche Ratings Revisited - Soldano	9:30 AM – 1:00 PM	Fontainebleau B
Seminar 4	AC Electric Machines: Modeling and Control - Torrey	9:30 AM – 1:00 PM	Versailles Gallerie
Seminar 5	EMC Enhanced Power Supply Design - Wittenbreder	9:30 AM – 1:00 PM	Fontainebleau C
Seminar 6	Multiconverter Three-Phase Power Conversion Systems - Neacsu	2:30 PM – 6:00 PM	Fontainebleau A
Seminar 7	Sensorless Current Mode Control: A Line-Disturbance-Immune Controller for DC-DC Converters - Midya	2:30 PM – 6:00 PM	Fontainebleau D
Seminar 8	Power Packaging Techniques with Emphasis on High Current Applications - Hopkins	2:30 PM – 6:00 PM	Fontainebleau B
Seminar 9	Synthesis of Advanced Control Methodologies for High-Grade Adjustable Speed Motor Drives: Theory and Applications - Fahimi	2:30 PM – 6:00 PM	Versailles Gallerie
Seminar 10	Virtual Prototyping of Magnetic Components - Prieto	2:30 PM – 6:00 PM	Fontainebleau C
Monday, February 10			
Registration Desk Open		8:00 AM – 3:00 PM	Grand Gallerie
Seminar 11	Computer Aided Analysis and Design of Single Phase APFC Stages - Ben-Yaakov	8:30 AM – 12:00 Noon	Fontainebleau A
Seminar 12	A Primer on Simulation, Modeling, and Design of the Control Loops of Switching Regulators - Erickson	8:30 AM – 12:00 Noon	Fontainebleau D
Seminar 13	Design Criteria for Modern Power Semiconductor Devices in AC-DC and DC-DC Converter Applications - Deboy	8:30 AM – 12:00 Noon	Fontainebleau B
Seminar 14	Vehicular Power Electronics: Automotive and Aerospace Applications of Power Electronic Converters and Motor Drives - Ehsani	8:30 AM – 12:00 Noon	Versailles Gallerie
Seminar 15	Integrated Power Magnetics Design Techniques - Bloom	8:30 AM – 12:00 Noon	Fontainebleau C
Session 1	Plenary Session	1:30 PM – 5:00 PM	Fontaine Room
Spouse & Guest Welcoming		8:30 AM – 9:30 AM	Imperial IV
Spouse & Guest Tour-Classic Miami		10:00 AM – 3:00 PM	Imperial IV
Exposition Hall Open		5:30 PM – 8:00 PM	Grand Ballroom
Micro Mouse Contest		8:00 PM – 10:00 PM	Fleur de Lis Room
Tuesday, February 11			
Registration Desk Open		8:00 AM – 3:00 PM	Grand Gallerie
Session 2	Inverters and Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 3	Hard Switched DC-DC Converters	8:30 AM – 12:00 Noon	Fontainebleau B
Session 4	Utility Interface	8:30 AM – 12:00 Noon	Fontainebleau C
Session 5	Meeting the Challenge – The New Market Reality	8:30 AM – 12:00 Noon	Fontainebleau D

APEC 2003 — CONFERENCE AT A GLANCE

Tuesday, February 11 (continued)			
Session 6	Three Phase Inverters	8:30 AM – 12:00 Noon	Versailles Gallerie
Spouse & Guest Tour -Miami Waterway		9:30 AM – 2:30 PM	Imperial IV
Exposition Hall Open		12:00 Noon – 6:30 PM	Grand Ballroom
Exhibitor Seminars See Exposition Directory For Seminar Descriptions		2:00 PM – 5:30 PM	See Exposition Directory
Rap Session I		6:30 PM – 8:00 PM	Fontainebleau A
Rap Session II		6:30 PM – 8:00 PM	Fontainebleau B
Rap Session III		6:30 PM – 8:00 PM	Fontainebleau C
Wednesday, February 12			
Registration Desk Open		8:00 AM – 3:00 PM	Grand Gallerie
Session 7	BLDC Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 8	DC-DC Converters – Control and Synchronous Rectification	8:30 AM – 12:00 Noon	Fontainebleau B
Session 9	Single Phase PFC	8:30 AM – 12:00 Noon	Fontainebleau C
Session 10	VRM General	8:30 AM – 12:00 Noon	Fontainebleau D
Session 11	Reliability, Analysis, EMI and Testing	8:30 AM – 12:00 Noon	Versailles Gallerie
Session 12A	Soft Switching Inverters	8:30 AM – 10:15 AM	French Rooms
Session 12B	Photovoltaic Converters	10:45 AM – 12:00 Noon	French Rooms
Session 13	PWM Techniques	2:00 PM – 5:30 PM	Fontainebleau A
Session 14	Soft-Switched, Low and Mid-Voltage DC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau B
Session 15	Single-Phase PFC and AC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau C
Session 16	VRM 12 Volt Input	2:00 PM – 5:30 PM	Fontainebleau D
Session 17	Components and Packaging	2:00 PM – 5:30 PM	Versailles Gallerie
Session 18	Power System Architectures	2:00 PM – 5:30 PM	French Rooms
Exposition Hall Open		12:00 Noon – 2:00 PM	Grand Ballroom
Conference Banquet		TBD – 10:00 PM	Lady Windridge
Thursday, February 13			
Registration Desk Open		8:00 AM – 12:00 Noon	Grand Gallerie
Session 19	Induction Motor Drives	8:30 AM – 12:00 Noon	Fontainebleau A
Session 20	Various Control Methods for DC-DC Converters	8:30 AM – 12:00 Noon	Fontainebleau B
Session 21	Power Quality	8:30 AM – 12:00 Noon	Fontainebleau C
Session 22	Semiconductors	8:30 AM – 12:00 Noon	Fontainebleau D
Session 23	Modeling, Simulation and Controls	8:30 AM – 12:00 Noon	Versailles Gallerie
Session 24A	Synchronous Motor Drives	2:00 PM – 3:45 PM	Fontainebleau A
Session 24B	Thermal Issues	4:15 PM – 5:30 PM	Fontainebleau A
Session 25	High Voltage Soft-Switched DC-DC Converters	2:00 PM – 5:30 PM	Fontainebleau B
Session 26	Converters, Inverters and Circuits	2:00 PM – 5:30 PM	Fontainebleau C
Session 27	Magnetic Devices and Materials	2:00 PM – 5:30 PM	Fontainebleau D
Session 28	Lamp Ballasts	2:00 PM – 5:30 PM	Versailles Gallerie

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