

Conference Chairman's Welcome

I would like to personally welcome you to the 1999 Industry Applications Technical Conference and Annual Meeting. The Conference Committee, the Valley of the Sun and the Board of Directors of the Industry Applications Society planned a series of outstanding sessions and events that will provide you with a unique opportunity to expand your professional horizons in a robust technical environment and to enjoy a first class experience in the Southwest.

The technical program is designed to provide participants with a variety of sessions and topics. Speakers will present leading edge subjects ranging from industrial process controls and drive applications to active power filters. We are pre-opening the conference and annual meeting on Sunday with a series of tutorials and several professional development sessions. The pre-conference program provides conference and meeting participants an opportunity to "get up to speed" on topics or exchange ideas with presenters addressing subjects that include Sensorless Control and Utility Interface. There is also a unique full-day session titled "Concepts in Clean Room Construction and Design".

As additional professional development opportunities, there are two outstanding non-technical workshops:

- Communication Connection: Technical Presentations with Power led by Jim Watson
- Life Work: Planning Your Career Toward Personal Values led by John Hoschette

As a bonus, our special events committee has planned several technical and recreational tours to locations throughout Arizona.

I know you will benefit from taking advantage of all that the conference and the Southwest have to offer. I look forward to seeing you in October.

Michael R. Andrews
Conference and Annual Meeting Chairman
Industry Applications Society 1999

Society Presidents Message

The IEEE Industry Applications Society and the IEEE Phoenix Section invite you to join us at the 1999 IAS Annual Meeting to be held on October 3-7 at the Hyatt Regency Hotel. The IAS Annual Meeting is the main event for the Society. Our activities include technical presentations from researchers and engineers around the globe, educational tutorials, practical seminars, informative product displays and dialogue on new technology, interaction with professionals in your field, and committee meetings for the development of programs and standards. The IAS is the best place to make new contacts and learn what is happening in your industry and profession.

The IAS Annual Meeting is directed towards commercial and industrial engineering developments and applications. Professionals in industry, academia, and students involved in electrical engineering and technology find our meeting of considerable value.

In addition to IAS business, there are activities to entertain both you and your spouse. Enjoy the IAS social programs and visit Phoenix's shopping centers. Phoenix is simply a beautiful city.

Ira J. Pitel
Industry Applications Society 1999

CONTENTS

Welcome! The IEEE Industry Applications Society and the Phoenix Section are proud to host the 34th Annual Meeting. This event will be held at the Hyatt Regency Hotel in downtown Phoenix, Arizona, October 3rd through the 7th of 1999. The conference is located downtown, adjacent to Phoenix Civic Plaza Convention Center, near legal, banking and governmental offices, Symphony Hall and Herberger Theater Center, 2 blocks to America West Arena, and 5 blocks to Bank One Ballpark, home of Arizona Diamondbacks baseball; 6 miles to Sky Harbor International Airport.

IAS is a world leader in the advancement of technology and the dissemination of technical information to support professionals engaged in the applications of electrical and electronics engineering to industry. For the latest information and details on the conference please log onto the conference website.

www.ewh.ieee.org/soc/ias/iasconf99

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TUTORALS — SUNDAY 3RD OCTOBER

Continuing Education Units will be available

Tutorial #1 - Utility Interface Issues of Power Electronic Equipment

Sponsored by the Industrial Power Converter Committee

Organizer: Geza Joos, Concordia University

Presenters: A. Ludbrook (Ludbrook and Assoc.), L.T. Moran (University of Concepcion), C. Melhorn (Electrotek), P. Enjeti (Texas A & M), A. Jackwani (Current Technology)

Length: full day

Early registration fee: \$150

Late registration fee: \$175

Abstract: With the increased use of customer-owned computers and other sensitive electronic equipment, electric power quality has become an important concern. Of particular importance is the harmonic distortion of voltages and currents produced by static power converters. This tutorial presents harmonic standards such as the IEEE 519 and the European standards developed to address these issues. It examines practical problems and presents case studies in relation to the application of standards. Issues discussed include: harmonics associated with converter operation, counter-measures, including passive filters, multi-pulse converters, active filters and active front-end rectifiers, and the effect of notches resulting from rectifier operation. Problems associated with the use of switched mode power supplies in four wire distribution systems are also presented, including solutions at the system level.

Tutorial #2 - Java Computing for Distributed Industrial Applications Over Internet

Sponsored by the Industrial Automation and Control Committee

Organizer and presenter: Paul Lin, Purdue University Fort Wayne Campus, Indiana

Length: full day

Early registration fee: \$150

Late registration fee: \$175

Abstract: Java is the first general purpose programming language designed with networking support in mind. As the World Wide Web continues to grow, Java is uniquely suited to build the next generation of distributed industrial applications that are able to perform massively parallel computing and send/receive data across the Internet. This tutorial course covers the following topics:

- Basic syntax of Java language
 - Introduction to TCP/IP network protocol and the Web
 - Java stand alone applications for industrial relay I/O control
 - Java native methods for calling assembly and/or C/C++ I/O functions
 - Java Applets for remote measurement and control
 - Programming examples and case studies of problems and solutions
-

Tutorial #3 - Sensorless Control and Complex Vector Control Analysis of AC Drives

Sponsored by the Industrial Drives Committee

Organizer: R. D. Lorenz, University of Wisconsin-Madison

Presenters: R. D. Lorenz (University of Wisconsin-Madison) and J. Holtz (University of Wuppertal, Germany)

Length: full day

Early registration fee: \$150

Late registration fee: \$175

Abstract: This tutorial will focus on two interrelated AC drives topics: sensorless control and complex vector modeling and control analysis. The two topics are woven into one tutorial so that the tools needed to evaluate comparative methods are presented together. The sensorless control presentations will focus on both low and high performance applications and will include both low frequency and high frequency operation. The presentations will include both torque control applications as well as motion control applications of sensorless control. The complex vector modeling presentations will focus on developing the practical insight needed to use these tools to improve AC drive controls design. The presentations will include both current and flux control as well as estimator/observer design.

TUTORIALS

Tutorial #4 - Concepts in Clean Room Construction and Design

Sponsored by Program Committee

Organizer: See Web page

Presenters: See Web page

Length: Full day

Early registration fee: \$150

Late registration fee: \$175

Course Content: This tutorial will cover design and construction considerations for today's fast moving, high-tech cleanroom construction process. Industry experts will

be providing instruction on project delivery, infrastructure systems, environmental systems and controls, electrical systems, and safety issues, and process tool accommodation.

Course Application: This course is designed to introduce engineers, constructors and suppliers who are interested in cleanroom construction to the needs of owners. The course will provide an excellent foundation for understanding the concepts and ideas behind the design and construction of today's cleanrooms.

Web address for more information on the Arizona State University Cleanroom Construction Program:
www.eas.asu.edu/~cleanrm

Tutorial #5 - Advanced Simulation of Power Electronics and Motor Drives using PSpice

Sponsored by the Industrial Drives Committee

Organizer: M. Giesselmann, Texas Tech University

Presenters: M. Giesselmann (Texas Tech University) and N. Mohan (University of Minnesota)

Length: Half day

Early registration fee: \$100

Late registration fee: \$125

Abstract: 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 an 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. In this tutorial, we will specifically address modeling and simulations of power electronic converters and motor drives.

Tutorial #6 - Neural Networks in Control Systems

Sponsored by the Industrial Automation and Control Committee

Organizer: R. G. Harley, University of Natal, South Africa

Presenters: B. Burton and R. G. Harley (University of Natal, South Africa) and T. G. Habetler, (Georgia Institute of Technology)

Length: Half day

Early registration fee: \$100

Late registration fee: \$125

Abstract: The primary aim of this tutorial is to provide control engineers and researchers, new to the field of neural networks, with the fundamentals required to benefit from and contribute to the rapidly growing body of work on their application in control systems. In particular, a clear understanding of different ANN architectures and the convergence mechanisms of different training algorithms will be developed from first principles by means of simple numerical examples which will illustrate how ANNs can be

used as universal approximators and classifiers. Most applications of ANNs at present use only offline training. This tutorial will describe the application of the static ANN approximators and classifiers which result from offline training, and explain when continual online training (COT) is required. The convergence mechanisms of COT will also be illustrated by means of simple numerical examples, and the potential power and numerous advantages of the adaptive ANN approximators and classifiers which result from COT will be discussed. In control system applications, approximators are useful for system identification and control and forecasting, and classifiers are useful for condition monitoring. This tutorial will illustrate each of these uses by means of the following examples from previous publications: static and adaptive ANN identification and control of VSI fed induction motors, improved regulator performance using an adaptive ANN forecaster and condition monitoring of induction motors using a static ANN classifier. Finally, the key issues relating to the real time implementation of offline trained and COT ANNs in control system applications will be discussed, and the state of the art in off the shelf ANN hardware will be reviewed.

TUTORIALS

Tutorial #7 - Design, Safety and Protection Issues in Static Power Converters

Sponsored by the Industrial Power Converter Committee

Organizer: G. Joos, Concordia University

Presenters: A. Stevenson (GE) and J. Galloway (Galloway and Assoc.)

Length: Half day

Early registration fee: \$100

Late registration fee: \$125

Abstract: Design, manufacturing and operating power converters involves solving practical problems that are not usually discussed in the technical literature. This tutorial draws attention to these issues and offers solutions to problems raised in industrial environments. Issues addressed include: protection coordination, semiconductor failure mechanisms, fuse selection and operation; voltage transients and protection, including snubber circuits and filters; harmonic instability and the impact of power factor correction capacitors; equipment explosion rating and arcing faults; equipment and cable layout and spacing; grounding, noise coupling and leakage currents. The tutorial covers PWM converters, including medium voltage converters and drives.

WORKSHOPS

PROFESSIONAL DEVELOPMENT WORKSHOPS SUNDAY 3RD OCTOBER

1–Life Work: Planning Your Career Toward Personal Values

Sponsored by the Management Committee

Organizer:

Presenters: John Hoschette

Enhance your career growth potential in this workshop presented by Mr. John Hoschette, an accomplished Engineer, teacher, speaker and Author of "Career Advancement & Survival for Engineers"

THE WORKSHOP:

Learn how to gain control of your career and get ahead quickly. The engineer will develop a career action plan tailored to their specific needs based on their own personal values. Valuable insights on how to shorten the time to the next advancement and get your career on the fast track.

YOU WILL LEARN:

How to identify and prioritize personal values & obtain balance in your life. Next, the engineer will develop a mission statement, career paths & goals and finally an action plan to accomplish these goals. This workshop, designed and taught by an engineer, is like no other

seminar ! You will learn at least 15 ways to enhance and develop your career.

Outline:

- Process for Developing Career Mission Statement, Goals, Strategic Plans
- Self Evaluation & Identification of Values
- Personal and Career
- Mission Statements
- Obtaining Balance in your Life
- Equation of Success
- Career Paths and Goals
- Action Plan for Success
- Summary

Examples of setting priorities, goal plan, mission statement, typical career path will be presented

Career Advancement book will be available for purchase. Other resources will be provided such as reading material and contacts.

Length: Half day

Early registration fee: \$100

Late registration fee: \$125

WORKSHOPS

PROFESSIONAL DEVELOPMENT WORKSHOPS CONTINUED

2-Communication Connection

Sponsored by the Management Committee

Organizer:

Presenters: Jim Watson, P.E.

Length: Half day

The growing impact of technology on the world places engineers and other technical professionals in new and challenging roles. To be successful in these new positions of leadership, we need to communicate more effectively with audiences of all sizes. Although speaking opportunities may cause anxiety, we can successfully overcome nervousness,

build our confidence, and improve results for greater success. This workshop has been designed by an engineer for engineers and other technical professionals. It is a common sense, practical approach to develop skills that build confidence and result in powerful oral presentations. The workshop includes basic principles of communication and demonstrations of new tools to enhance the communication process. Attendees will leave the workshop with information and skills to be effective in a variety of on-the-job oral presentations.

Early registration fee: \$100

Late registration fee: \$125

Associated Workshop – Friday October 8th

Fuel Cells Workshop

The Interconnect-3 power quality workshop will provide the participants a full day of opportunity to consider issues related to distributed generation and interconnection with existing grids. The participants will compare implementation methodologies and strategies that work. Comparisons between technologies (Photovoltaics, Wind, Biomass, Micro turbines, and Fuel Cells) will allow for progress towards a single unified interconnection standard, applied nationwide. Participants will be able to provide

input to the IEEE through contacts made at the Workshop and the Workshop proceedings will be furnished to the IEEE for their use. Participants will also be asked to help define the steps necessary to arrive at a workable universal interconnection standard and its quick acceptance by all utilities.

For further information contact Robert Wichert — wichert@fuelcells.org and visit the web site at <http://www.usfcc.com/Interconnect3.htm>

SPECIAL EVENTS

Sunday	Chairs Reception (evening)
Monday	Myron Zuckerman Students Lunch
	Casino Night (evening)
Tuesday	Award Luncheon
Wednesday	President's Award dinner (evening)

IAS 99 Companion Tour Descriptions

*Indicates Lunch is provided

Monday	Dolly Steam Boat Tour with Goldfield Tourist Town Stop
Tuesday	Downtown Phoenix Tour with Orphium Theater and Heard Museum
	Scottsdale City Tour/Shopping
Wednesday	Sedona Tour with Oak Creek
Thursday	Jeep Tour

DAY: MONDAY, OCTOBER 4, 1999

Early Registration Price: \$93*

Activity: Dolly Steam Boat Tour with Goldfield Tourist Town Stop

On-Site Registration Price: \$112*

This tour on the Apache Trail will be a delight, taking in the rugged beauty of the Superstition Mountains, home of the Lost Dutchman's Gold Mine. Once out near the Superstitions, there will be a short desert walk. Your guide will point out the different plant and animal life native to this area.

Your narrated cruise on Dolly's Steamboat lasts 1-1/2 hours and will be on to remember. The Canyon Lake area is one of the largest producers of amethyst in the world. Lunch will be at the locally famous Tortilla Flat population of 6, Lakeside Marina or perhaps Goldfield Ghost town.

DAY: TUESDAY MORNING, OCTOBER 5, 1999

Early Registration Price: \$49

Activity: Downtown Phoenix Tour w/ Orphium Theater and Heard Museum

On-Site Registration Price: \$52

Tour the history and sites of downtown Phoenix and the Orphium Theater. Then visit the newly renovated Heard Museum on southwest culture. Experience the City in the Desert from adobe haciendas to the luxurious homes of celebrities; from the natural beauty of the desert to the man-made oases. This tour covers the highlights of the Valley of the Sun. Sights along the way include the exclusive township of Paradise Valley, the Arizona Biltmore Estates, a drive up one of our mountains for an overview of the Valley, and the Heard Museum of native American culture.

Activity: Scottsdale City Tour/Shopping

Early Registration Price: \$41

On-Site Registration Price: \$49

Shop where the stars shop! A main attraction for Scottsdale is the downtown shopping area where theme shops abound. Experience the offerings native to Arizona and the southwest.

SPECIAL EVENTS

DAY: WEDNESDAY, OCTOBER 6, 1999

Activity: Sedona Tour with Oak Creek

Board the bus and go to the red rock country of Sedona with its many shops and sites. Many celebrities privately hold houses in this highly desired town. From Sedona the bus will traverse the beautiful Oak Creek Canyon, a tree lined trip through amazing rock formations. The trip tops out in the tall pines of Arizona's high country and returns to Phoenix.

Early Registration Price: \$119*

On-Site Registration Price: \$142*

DAY: THURSDAY AFTERNOON, OCTOBER 7, 1999

Activity: Jeep Tour

The best way to experience Arizona's back country is in an open Jeep. This tour provides a scenic desert ride and short walking tour along with narration on the native plants and history. Target practice is an option for interested parties. We end it up with a bar-b-que in the desert and then return you to your hotel around evening. Note that This trip does go on some rough roads and the open air vehicles can be enclosed with canvas sides. Approximate length 5 hours

Early Registration Price: \$97*

On-Site Registration Price: \$116*



Activity: Grand Canyon Tour

For those seeking a tour to the Grand Canyon we suggest that you contact Vaughan's Southwest Custom Tours Inc. and mention that you are interested in a tour and are attending the IEEE IAS Conference and are interested in a tour of the Grand Canyon.

Leonardo A. Gem Sales Representative

Address: Vaughan's Southwest Custom Tours, Inc.

PO Box 31250 Phoenix, AZ 85046 • Telephone: (800) 513-1381 or (602) 971-1381

FAX: (602) 992-5596 E-mail: swct@netwr.x.net • sw_tours@aol.com & Lgem1@aol.com

IAS 99 Technical Tour Descriptions

Monday

Bank One Ball Park AM

AZ Science Center PM

Tuesday

Phoenix Newspaper Plant Tour

Wednesday

Arizona Public Service (APS) Palo Verde

Nuclear Plant Tour

Thursday

Salt River Project (SRP) CAP and Power

Distribution; Mormon Flat Dam

DAY: MONDAY, OCTOBER 5, 1999

Activity: Bank One Ball Park A.M. / AZ Science Center P.M.

Early Registration Price: \$5

On-Site Registration Price: \$6



Bank One Ballpark is an engineering marvel. To assure the comfort of its occupants, the environment is controlled through a combination of a moving roof and walls along with a sophisticated HVAC system. We contacted the engineers of this facility to give you a first hand look at how technology provides

SPECIAL EVENTS



for perfect environmental conditions in a sports arena. Bank One Ballpark is within walking distance of downtown Phoenix and the IAS Meeting Center at the Hyatt.

The basic tour includes the following highlights:

Rotunda, Fox Sports Arizona DiamondTown, Diamondbacks Field, Fry's Picnic Pavilion, Cox Clubhouse, Sun Pool Party Pavilion, Arizona Baseball Club, Party Suites, Visitor's Underground Batting Tunnel Visitor's Clubhouse, Press Box, Strike Zone Lounge, Home Dugout, Team Shop

DAY: MONDAY AFTERNOON, OCTOBER 5, 1999

Early Registration Price: \$10

Activity: AZ Science Center PM

On-Site Registration Price: \$12

Join us on a visit to the Arizona Science Center. The Science Center is built for kids but appeals to grown ups; especially engineers. Come along and observe plane landing at Sky Harbor Airport, a hot air balloon, the phenomenon of erosion or just relax in the planetarium. In addition to exhibits, the Science Center features the Dorrance Planetarium, and Irene P. Flinn Theater.

DAY: TUESDAY, OCTOBER 5, 1999

Early Registration Price: \$25*

Activity: Phoenix Newspaper Plant Tour

On-Site Registration Price: \$30*

Producing a newspaper requires a high degree of automation and precise control systems. This tour shows the plant operation and equipment. The basic tour is a favorite public attraction and we have skewed this one to enhance the experience for our technical audience. we have picked a specific print day in order to see the plant in action.

DAY: WEDNESDAY, OCTOBER 6, 1999

Early Registration Price: \$40*

Activity: Arizona Public Service (APS) Palo Verde Nuclear Plant Tour

On-Site Registration Price: \$48*

Palo Verde Nuclear Generating Station is the largest nuclear electric generating site in the United States. Three (3) Combustion Engineering Pressurized Water Reactor units each have an output of ~ 1270 MWe. Each unit has 2 reactor cooling loops, each with a 2 reactor cooling pump and a single steam generator. Arizona Public Service Company is the operator and co-owns the units with utilities in New Mexico, Texas, and California. The Palo Verde site is at Wintersberg, Arizona, 34 miles west of Phoenix. Units 1 and 2 went commercial in 1986 and Unit 3 in 1988.†

DAY: THURSDAY, OCTOBER 7, 1999

Early Registration Price: \$43*

Activity: Salt River Project (SRP) CAP and Power Distribution; Mormon Flat Dam

On-Site Registration Price: \$52*

The secret to having a city in the desert lies in the channeling of water from far away sources. Salt River Project combines a unique systems of canals and dams in order to provide water and power to the growing population of the Valley of the Sun. The Mormon Flat Dam is special as its turbines act both as generators and as pumps. Come and see how this arrangement produces power and adjusts water level.

Mormon Flat Dam is named after nearby Mormon Flat, a place where pioneers from Utah stopped to camp en route to the Valley. The dam, built between 1923-25, is 224 feet high and 380 feet long. Two hydroelectric generating units are at the dam; one is a conventional unit rated at 10,000 kW; the other is a pumped storage unit built in 1971 and rated at 50,000 kW. The pumped storage unit permits recycling of water for hydroelectric production and keeps lake levels relatively constant.

AIRFARES

Negotiated Airfares for IAS Annual Conference:

Special discounted airfares have been negotiated with Continental and United Airlines. Continental Airlines is offering a 10% discount off the lowest available super-saver fares, and a 13% discount off coach fares. United Airlines is offering a 5% discount off the lowest available super-saver fares, and a 10% discount off coach fares. If booked 60 days in advance, both airline carriers are offering an advanced booking incentive that increases the discount by an additional 5%. Where super-saver fares or Saturday night stays are not applicable, both Continental and United Airlines are offering zone fares. Discounted airfares are also available on other airline carriers.

Please contact IEEE Travel Services for availability.

Telephone (800) TRY-IEEE, (800-879-4333). Within the US and Canada

(732) 562-5387 Outside of the US and Canada Fax (732) 562-8815. E-mail: HYPERLINK "mailto:travel-team@ieee.org"travel-team@ieee.org

TECHNICAL PROGRAM COMMITTEE

34th Annual Meeting - IEEE Industry Applications Society

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Power Electronics Devices and Components Committee

Dr. W. Portnoy

IAS TECHNICAL PROGRAM
Monday Morning

9/15/99

Session 1 - Monday, October 4 – Flagstaff 4/5 Room
8:30 am

ELECTROSTATICS PROCESSES
Corona and Discharge Phenomena

Session Chair: I.I. Inculet, The University of Western Ontario, London, ONT, CANADA
Session Organizer: R. Sundararajan, Arizona State University East, Mesa, AZ, USA

1.1 8:30 am **Novel Applications of Natural Charge Exchange Phenomena in Domestic Aerosol Products**, L.F. Whitmore, J. F. Hughes, R.T. Fox, N. Harrison, Bioelectrostatics Research Center, Southampton, UNITED KINGDOM

1.2 9 am **Bipolar DC Corona Discharge Characteristics from a Floating Metal Particle**, K. Asano, K. Yatsuzuka, Yamagata University, Yamagata-ken, JAPAN

1.3 9:30 am **Corona Wind in a Cylindrical Corona Generator**, W.D. Greason, Z. Kucerovsky, A. Weigl, University of Western Ontario, London, ONT, CANADA

1.4 10 am **Demonstration of Flue Gas Cleaning by Positive Pulsed Corona Discharge Processes**, Y. S. Mok, K.T. Kim, Research Institute of Industrial Science & Technology, Pohang, KOREA

1.5 10:30 am **Mobilities of Charge Carriers in Gas Mixtures**, Z. Kucerovsky, University of Western Ontario, London, ONT, CANADA

1.6 11 am **Steady State Corona Charging Behavior of a Corotron over a Moving Dielectric Substrate**, J. Q. Feng, P.W. Morehouse, J.S. Facci, Xerox Corporation, Webster, NY, USA

1.7 11:30 am **Electrostatic Characterization of Carpets and Rugs**, A. S. Faesarella, R.A.C. Altafi, University of Sao Paulo at Sao Carlos, Sao Carlos, BRAZIL

Session 2 - Monday, October 4 – Phoenix 11/12 Room
8:30 am

INDUSTRIAL POWER CONVERTERS
PWM and Current Regulation

Session Chair and Organizer: D. Graham Holmes, Monash University, Melbourne, AUSTRALIA

2.1 8:30 am **A Space Vector PWM Technique for Two-Phase Inverter-Fed Single-Phase Induction Motors**, Do-Hyun Jang, Duck-Yong Yoon, Hoseo University, Chungnam, KOREA

2.2 9 a.m. **An Auxiliary Zero State Synthesizer to Reduce Common Mode Voltage in Three Phase Inverters**, Madhav Manjrekar, Thomas J. Lipo, University of Wisconsin-Madison, Madison, WI, USA

2.3 9:30 am **Low Cost Battery Powered Switched Reluctance Drives with Integral Battery Charging Capability**, W. K. Thong, C. Pollock, University of Warwick, Coventry, UNITED KINGDOM

2.4 10 am **A SVM Strategy and Design of a ZVT Three-Phase Inverter for Electric Vehicle Drive Applications**, Jae-Young Choi, Dushan Boroyevich, Fred C. Lee, Virginia Polytechnic Institute, Blacksburg, VA, USA

2.5 10:30 am **A Dead-Beat Adaptive Hysteresis Current Control**, Simone Buso, S. Fasolo, L. Malesani, P. Mattavelli, University of Padova, Padova, ITALY

2.6 11 am **Induction Motor DTC Strategy Using Discrete-Time Sliding Mode Control**, Francesco S. Neves, Regis P. Landim, DEESP/UFPE, BRAZIL, Thomas G. Habetler, Georgia Institute of Technology, Atlanta, GA, USA; Benjamin R. Menezes, Selenio R. Silva, DEE/UFMG, BRAZIL

2.7 11:30 am **New Control Techniques for Inverter Flux**, Mukul Chandorkar, ABB Corporate Research Ltd., Baden-Dttwil, SWITZERLAND

Session 3 - Monday, October 4 - Flagstaff 1/2/3 Room

8:30 am

ELECTRIC MACHINES PM Machines I, Design and Analysis

Session Chair: Eduard Muljadi, National Renewable Energy Laboratory, Golden, CO, USA

Session Organizer: Iqbal Hussain, The University of Akron, Akron, OH, USA

3.1 8:30 am **Permanent Magnet Machines with Powdered Iron Cores and Pre-Pressed Windings**, A.G. Jack, B. C. Mecrow, P.G. Dickinson, D. Stephenson, J.S. Burdess, J.N. Fawcett, T. Evans, University of Newcastle Upon Tyne, Merz Court, UNITED KINGDOM

3.2 9 am **Analytical and Numerical Computation of Airgap Magnetic Fields in Brushless Permanent-Magnet Motors**, Keld F. Rasmussen, TJE Miller, M.I. McGlip, J.I. Davies, M. Olaru, University of Glasgow, Glasgow, UNITED KINGDOM

3.3 9:30 am **Design and Performance Evaluation of a PM Linear Synchronous Motor with Magnetic Guides for Industrial Applications**, Francesco Profumo, A. Tenconi, F. Gianolio, K. Gigliotti, Politecnico di Torino, Torino, ITALY

3.4 10 am **Design Considerations for PM Synchronous Motor with Rotor Saliency for High Speed Drives**, Nicola Bianchi, S. Bolognani, B.J. Chalmers, University of Padova, Padova, ITALY

3.5 10:30 am **Impact of Saturation on Interior PM Synchronous Machine Design Optimization**, Edward Lovelace, Jeffrey H. Lang, Massachusetts Institute of Technology, Cambridge, MA, USA, Thomas M. Jahns, University of Wisconsin-Madison, Madison, WI, USA

3.6 11 am **A Novel Electric Machine Employing the Torque Multiplication and Flux Concentration Effects**, Dinyu Qin, Capstone Turbine Corporation, Woodland Hills, CA, USA, Thomas A. Lipo, Ronghai Qu University of Wisconsin, Madison, WI, USA

Session 4 - Monday, October 4 – Phoenix 16/17/18 Room

8:30 a.m.

INDUSTRIAL DRIVES Permanent Magnet and Induction Motor Drives I

Session Chair: Richard Dugan, Kollmorgen Corporation, Radford, VA, USA

Organizer: Eduard Muljadi, National Wind Technology Center, Golden, CO, USA

- 4.1 8:30 am **Review of Sensorless Methods for Brushless DC**, James P. Johnson, Merhdad Ehsani, Texas A&M University, College Station, TX, USA
- 4.2 9 am **Sensorless Brushless DC Control Using a Current Waveform Anomaly**, James P. Johnson, Merhdad Ehsani, Texas A&M University, College Station, TX, USA
- 4.3 9:30 am **A Sensorless Direct Torque Control Technique for Permanent Magnet Synchronous Motors**, Minghua Fu, Longya Xu, The Ohio State University, Columbus, OH, USA
- 4.4 10 am **Comparison of Six-Step Voltage and Constant Back EMF Control Strategies for PMSM**, R. Monajemy, R. Krishnan, Virginia Polytechnic Institute, Blacksburg, VA, USA
- 4.5 10:30 am **Development of Low Cost Multi-Phase Brushless Permanent Motors with Unipolar Current Excitations**, T. Goplarathnam, S. Walker, H. A. Toliyat, M.S. Arefeen, Texas A & M University, College Station, TX, USA, J.C. Moreira, Whirlpool Corporation, Benton Harbor, MI, USA
- 4.6 11 am **A Sensorless Induction Motor Drive for Low Speed Applications Using a Novel Stator Resistance Estimation Method**, Giuseppe Guidi, Hidetoshi Umida, Fuji Electric R&D Ltd., Tokyo, JAPAN
- 4.7 11:30 am **Sensorless Very Low and Zero Speed Estimations with On-Line Secondary Resistance Estimation of Induction Motor Without Adding any Signal**, Kan Akatsu, Atsuo Kawamura, Yokohama National University, Yokohama, JAPAN

**Session 5 - Monday, October 4 – Prescott 8/9/10 Room
8:30 a.m.**

**MINING
General Applications**

Session Chair and Organizer: Ken Sacks, Pittsburgh Research Laboratory, NIOSH, Pittsburgh, PA, USA

- 5.1 8:30 am **Condition Monitoring and Fault Diagnosis of Electrical Machines - A Review**, H. A. Toliyat, S. Nandi, Texas A & M University, College Station, TX, USA
- 5.2 9 am **Condition-Based Maintenance of Electrical Machines**, J. Kohler, Natl Institute for Occupational Safety & Health, Pittsburgh, PA, USA, J. Sottile, F.C. Trutt, University of Kentucky, Lexington, KY, USA
- 5.3 9:30 am **The Effects of Very-High Resistance Grounding on the Selectivity of Ground-Fault Relaying in High-Voltage Longwall Power Systems**, T. Novak, University of Alabama, Tuscaloosa, AL, USA
- 5.4 10 :30 am **A GTO Powered AC Drive System Increases the Performance of Off-Highway Haul Trucks**, G. Brown, W. Koellner, Siemens Energy & Automation, Inc., Alpharetta, GA, USA
- 5.5 11 am **Mobile Roof Support Load Rate Monitoring System**, W. L. Howie, J.K. Owens, Nat'l Institute for Occupational Safety & Health, Spokane, WA, USA
- 5.6 11:30 am **An Alternate Approach to Reducing Injuries and Fatalities Caused by Contact of Cranes, Drill Rigs, and Haul Trucks with High Tension Lines**, J. C. Cawley,

H.K Sacks, G.T. Homce, M.R. Yenchek, National Institute for Occupational Safety and Health, Pittsburgh, PA, USA

Session 6- Monday, October 4 – Phoenix 13/14/15 Room

8:30 a.m.

**PRODUCTION AND APPLICATION OF LIGHT
Fluorescent Lamp Ballasts**

Session Chair: J.M.Alonzo, Universidad de OVIEDO, Gijon, SPAIN

Session Organizer: F.P. Dawson, University of Toronto, Toronto, ONT, CANADA

6.1 8:30 am **A Novel Parallel-Resonant Programmed Start Electronic Ballast,**
Bryce Hesterman, Thomas M. Poehlman, MagneTek, Madison, AL, USA

6.2 9 am **A Low Cost High Power Factor Electronic Ballast for Compact
Fluorescent Lamp,** Ricardo N. do Prado, Mario Jungbeck, Alysson R. Seidel, Marcelo Freitas,
Universidade Federal de Santa Maria, Santa Maria, BRAZIL

6.3 9:30 am **Application of Single-Transistor Smart-Power IC for Fluorescent
Lamp Ballast,** Matthias Radecker, Yen-Ly Nguyen, Fraunhofer-Institut of Microelectronic Circuits
& Systems, Duisburg, GERMANY

6.4 10 am **Design and Experimental Results of an Input-Current-Shaper Based
Electronic Ballast,** A. J. Calleja, J.M. Alonso, J. Ribas, E.L. Corominas, M. Rico, J. Sebastian,
Universidad de Oviedo, Gijon, SPAIN

6.5 10:30 am **New Topologies for Low-Power and Low-Input-Voltage Fluorescent
Lamp Ballasts: Tapped-Inductor-Inverters Analysis and Design Criteria,** E. L. Corominas,
J.M. Alonso, A.J. Calleja, J. Ribes, M. Rico-Secades, Universidad de Oviedo, Gijon, SPAIN

6.6 11 am **Improvement on Component Stresses of Single-Stage Electronic
Ballasts,** Tsai-Fu Wu, C-Y Lee, Y-J Wu, J-Y Su, National Chung Cheng University, Chia-Yi,
Taiwan, REPUBLIC OF CHINA

Session 7 - Monday, October 4 – Prescott 6/7 Room

8:30 a.m.

**INDUSTRIAL AUTOMATION AND CONTROL
Industrial Process Controls I**

Session Chair: Muhammed H. Rashid, University of West Florida, Pensacola, FL, USA

Session Organizer: Akram Hossain, Purdue University Calumet, Hammond, IN, USA

7.1 8:30 am **Voice Actuation with Context Learning for Intelligent Machine
Control,** Raymond Sepe, Jr., James Pace, Electro Standards Lab., Inc., Cranston, RI, USA

7.2 9 am **Web Machine Coordinated Motion Control via Electronic Line-
Shafting,** Robb G. Anderson, Andrew J. Meyer, Anibal Valenzuela, Robert Lorenz, University of
Wisconsin-Madison, Madison, WI, USA

7.3 9:30 am **A New Configuration of Drive System for High Speed Gearless
Elevator,** D.W. Chung, H.M. Ryu, Y.M. Lee, Seung-Ki Sul, S.J. Kang, J.H. Song, J.S. Yoon, K.H.
Lee, L.W. Kang, J.H. Seo, Seoul National University, Seoul, KOREA

7.4 10 am **Automatic Learning Technique for On-Line Control and
Optimization of Transformer Core Manufacturing Process,** P.S. Geirgukajusm N. D.

Hatziargyriou, D.G. Oaoarugasm J.A. Bakopoulos, S.S. Elefsiniotis, National Technical University of Athens, Athens, GREECE

7.5 10:30 am **Pitch-Controlled Variable-speed wind Turbine Generation**, Eduard Muljadi, C.P. Butterfield, National Renewable Energy Lab, Golden, CO, USA

7.6 11 am **Conception of Computer Package for Optimization of Power Station Control**, R. Kulesky, G. Nudelman, Israel Electric Corporation Ltd., Haifa, ISRAEL

**Session 8 - Monday, October 4 – Phoenix 19/20 Room
8:30 a.m.**

**POWER ELECTRONICS COMPONENTS AND DEVICES
Diodes and GTOs**

Session Chair: Oscar Apeldoorn, ABB Industry, AG, Turgi, SWITZERLAND

Session Organizer: William M.Portnoy, Texas Tech University, Lubbock, TX, USA

8.1 8:30 am **A Comparative Evaluation of New Silicon Carbide Diodes and State-of-the-Art Silicon Diodes for Power Electronic Applications**, Ahmed Elasser, M. Ghezzi, M. Keraluwala, R.L. Steigerwald, N. Krishnamurthy, J. Kretchmer, GE Corporate Research & Development, Niskayuna, NY, USA

8.2 9 am **SiC High Power PIN Diode Characterization and Modeling**, N. Keskar, R. Vijayalaxmi, N. Xu, M. Trivedi, Krishna Shenai, University of Illinois at Chicago, Chicago, IL, USA, P. Neudeck, NASA Lewis Research Center, Cleveland, OH, USA

8.3 9:30 am **1200V, 50A Trench Oxide PIN Schottky (TOPS) Diode**, H.R. Chang, R.N. Gupta, C. Winterhalter, Rockwell Science Center, Thousand Oaks, CA, USA, K.D. Humphrey, Conexent, Colorado Springs, CO, USA

8.4 10 am **Performance Characterization of Integrated Gate Commutated Thyristors**, Monica Guierrez. Giri Venkataramanan, Montana State University, Bozeman, MT, USA, A. Sundaram, Electric Power Research Institute, Palo Alto, CA, USA

8.5 10:30 am **MTO(tm) Thyristor: An Efficient Replacement for the Standard GTO**, Alex Q. Huang, Virginia Polytechnic Institute, Blacksburg, VA, USA

8.6 11 am **Test Circuit to Characterize Medium Voltage High Power Devices under Conventional and Soft-Switching Conditions**, Jochen von Bloh, Rik De Doncker, Aachen University of Technology, Aachen, GERMANY

8.7 11:30 am **Physically Based Models of High Power Semiconductor Devices for PSpice**, Stefan Schroeder, Rik De Doncker, Aachen University of Technology, Aachen, , GERMANY

Monday Afternoon

**Session 9 - Monday, October 4 – Flagstaff 4/5 Room
2 p.m.**

**ELECTROSTATIC PROCESSES
Computational Electrostatics**

Session Chair: K. Asano, Yamagata University, Yonezawa, JAPAN

Organizer: W. Balachandran, Brunel University, Uxbridge, Middlesex, UNITED KINGDOM

9.1 2 p.m. **Inception of Corona Discharges in Typical Electrode Configurations for Electrostatic Processes Applications**, D. Rafiroiu, R. Morer, I. Suarasan, P. Atten, L. Dascalescu, CNRS Laboratoire d'Electrostatique, Grenoble, FRANCE

9.2 2:30 pm **A Circuit Approach to Model Composite Structures Affected by Electrostatic Discharge**, Concettina Buccella, University of L'Aquila, L'Aquila, ITALY

9.3 3 pm **Finite Element Analysis of Corona in Wire-Duct Electrostatic Precipitator**, Zakariya Al-Hamouz, King Fahd University of Petroleum, Dhahran, SAUDI ARABIA

9.4 4 pm **Modeling of Conducting Particle Charging on Plate Electrodes Affected by Non-Uniform Electric Fields**, S. Vlad, M. Mihailescu, A. Iuga, L. Dascalescu, CNRS Laboratoire d'Electrostatique, Grenoble, FRANCE

9.5 4:30 pm **Pulse Corona Modeling of a Wire-Cylinder ESP under Loading Condition**, X. Liang, S. Jayaram, J.S. Chang, A. Berezein, University of Waterloo, Waterloo, ONT, CANADA

9.6 5 pm **Computation of the Transient Voltage Distribution Caused by Direct Lightning on Flammable Liquid Containers**, Concettina Buccella, University of L'Aquila, L'Aquila, ITALY

Session 10 - Monday, October 4 – Phoenix 11/12 Room
2 p.m.

INDUSTRIAL POWER CONVERTERS
Active Power Filters

Session Chair: Annette R. von Jouanne, Oregon State University, Corvallis, OR, USA

Session: Organizer: Giri Venkataramanan, Montana State University, Bozeman, MT, USA

10.1 2 pm **The Theory of Instantaneous Power in Three-Phase Four-Wire Systems: A Comprehensive Approach**, Hirofumi Akagi, Satoshi Ogasawara, Okayama University, Okayama City, JAPAN, Hyosung Kim, Cheonan Technical College, KOREA

10.2 2:30 pm **Dynamic Performance and Control of a Multilevel Universal Power Conditioner**, Leon M. Tolbert, Fang Zheng. Peng, Oak Ridge National Laboratory, Oak Ridge, TN, USA, Thomas G. Habetler, Georgia Institute of Technology, Atlanta, GA, USA

10.3 3 pm **Harmonic Sources and Filtering Approaches- Series/Parallel, Active/Passive, and Their Combined Power Filters**, Fang-Zheng Peng, Donald J. Adams, Oak Ridge National Laboratory, Oak Ridge, TN, USA

10.4 4 pm **Simulation Study of a Unified Power Flow Controller via Personal Computer Based Hybrid Simulator**, Alper Akdag, Hideaki Minakata, Susumu Tadakuma, Chiba Institute of Technology, Chiba, JAPAN

10.5 4:30 pm **A Practical Approach to Switching-Loss Reduction in a Large-Capacity Static Var Compensator Based Voltage-Source Inverters**, Hideaki Fujita, Shinji Tominaga, Hirofumi Akagi, Okayama University, Okayama, JAPAN

10.6 5 pm **A Control Strategy for General-Purpose Active Filters Based on Voltage Detection**, Yukihiro Sato, Takeshi Kawase, Masamitsu Akiyama, Tokyo Institute of Technology, Tokyo, JAPAN, Teruo Kataoka, Tokyo Denki University, Tokyo, JAPAN

**Session 11 - Monday, October 4 – Flagstaff 1/2/3 Room
2 p.m.**

**ELECTRIC MACHINES
Induction Machines I, Design and Analysis**

Session Chair: Jerry Lloyd, Emerson Electric Co., St. Louis, MO, USA

Organizer: Joseph O. Ojo, Tennessee Tech University, Cookeville, TN, USA

11.1 2 pm **Thermal Effects of Stray Load Losses in Induction Machines, A.A. Jimoh, University of Durban-Westville, Durban, SOUTH AFRICA**

11.2 2:30pm **A First Approach for the Iron Building Factor Determination, Aldo Boglietti, Politecnico di Torino, Torino, ITALY**

11.3 3:pm **Novel High Speed Induction Motor for a Commercial Centrifugal Compressor, W. L. Soong, University of Adelaide, Adelaide, AUSTRALIA, G.B. Kliman, R.N. Johnson, R. White, General Electric R&D, Schenectady, NY, USA, J. Miller, AO Smith, Tipp City, OH, USA**

11.4 3:30 pm **Non Linear Model and Momentary Performance Capability of a Cage Rotor Induction Machine Used as an Automotive Combined Starter-Alternator, Franco Leonardi, McCleer Power, Inc., Jackson, MI, USA**

11.5 4 pm **Investigation of Self Excited Induction Generators for Wind Turbine Applications, Eduard Muljadi, C.P. Butterfield, Jesus Sallan, Mariano Sanz, National Renewable Energy Lab, Golden, CO, USA**

11.6 4:30 pm **The Design of High-Efficiency Line-Start Motors, A.M. Knight, University of Alberta, Sherwood Park, AB, CANADA, C.I. McClay, Imperial College, London, , UNITED KINGDOM, S. Williamson, Brook Hansen, West Yorkshire, UNITED KINGDOM**

**Session 12 - Monday, October 4 – Phoenix 16/17/18 Room
2 p.m.**

**INDUSTRIAL DRIVES
Switched Reluctance Motor Drives**

Session Chair: Fred Brockhurst, Rose-Hulman Institute of Technology, Terre Haute, IN, USA

Session Organizer: John Miller, Ford Motor Co., Saline, MI, USA

12.1 2 pm **Developing a Sensorless Approach for Switched Reluctance Motors from a New Analytical Model, Subrata Saha, Kiyoe Ochiai, Takashi Kosaka, Nobuyuki Matsui, Yoji Takeda, Nagoya Institute of Technology, Nagoya, JAPAN**

12.2 2:30 pm **The Rotor Speed and Position Sensorless Control of SRM Using the Binary Observer, lee-Woo Yang, Inha University, Incheon, KOREA**

12.3 3:30 pm **A New Power Electronic Drive for Integrated Battery/Mains Motoring, M Barnes, C. Pollock, UMIST, Manchester, UNITED KINGDOM**

12.4 4 pm **A Linear Switched Reluctance Motor: Converter and Control, H.K.. Bae, B.S. Lee, P. Vijayraghavan, R. Krishnan, Virginia Polytechnic Institute, Blacksburg, VA, USA**

**Session 13 - Monday, October 4 - Prescott 8/9/10 Room
2 p.m.**

METAL INDUSTRY
Dynamics and Control for Mills and Casters

Session Chair and Organizer: Remn-Min Guo, ARMCO Technical Center, Middletown, OH USA

13.1 2 pm **Real Time Torque Measurement of Rolling Mill Drive**, Wing Chen, Jeffrey H. Shoup. ALCOA, Alcoa Center, PA, USA

13.2 2:30 pm **Strip Shape Control System of Mitsubishi CR Mill**, Shiroo Suzuki, Mitsubishi Heavy Industries Ltd, Nishi-ku, Hiroshima, JAPAN

13.3 3 p.m. **Analysis of Dynamic Behaviors of Tandem Cold Mills Using Generalized Dynamic and Control Equations**, Remn-Min Guo, ARMCO Technical Center, Middletown, OH, USA

13.4 3:30 pm **An Improvement of HAGC Response for CSC No. 1**, Yuan-Liang Hsu, Chang-Pin Liang, Song-Jau Tsai, China Steel Corporation, Kaohsiung, Taiwan, REPUBLIC OF CHINA

13.5 4 pm **Stabilization of the Molten Steel Level in the Mold of a Continuous Casting Machine by Means of Vacuum**, Miguel A. Barron, R. Aguilar, J. Gonzales, Universidad Autonoma Metropolitana-Azcapotzalco, Mexico City, DF, MEXICO

13.6 4:30 pm **A Virtual Rolling Mill for Real-Time Control System Tuning, Operator Training and Process Simulation**, Richard Li, Leon Winitsky, Jalal Bigou, Quad Engineering, Toronto, ONT, CANADA

Session 14 - Monday, October 4 – Phoenix 13/14/15 Room
2 p.m.

PRODUCTION AND APPLICATION OF LIGHT
HID Ballasts

Session Chair: Joe Olson, Osram Sylvania Products, Inc., Beverly, MA, USA

Organizer: F.P. Dawson, University of Toronto, ONT, CANADA

14.1 2 p.m. **Influence of Frequency and Current Waveform on Low pressure Sodium Lamp Operation**, Walter Kaiser, Escola Politecnica de Universidade de Sao Paulo, Sao Paolo, BRAZIL

14.2 2:30 pm **Experimental Results for a Pulsed Vortex Water High-Pressure Argon Lamp**, D. Kouroussis, R. Bonert, Francis Dawson, University of Toronto, Toronto, ONT, CANADA

14.3 3:30 pm **Designing an Ignitor for Short-Arc Xenon Lamps**, Chin S. Moo, Tsai Fu Lin, Y.C. Chuang, National Sun Yat-Sen University, Kaohsiung, Taiwan, Republic of China

14.4 4 pm **Modeling the Breakdown Process in a Vortex-Water-Wall-High-Pressure-Argon-Arc Lamp**, W. Yan, Francis Dawson, University of Toronto, Toronto, ONT, CANADA

Session 15- Monday, October 4 – Prescott 6/7 Room
2 P.M.

INDUSTRIAL AUTOMATION AND CONTROL
Intelligent Controls

Session Chair: Ahmed Rubaai, Howard University, Washington, DC, USA
Organizer: Marcelo Godoy Simoes, University of Sao Paulo, Sao Paulo, BRAZIL

- 15.1 2 pm **Application of Fuzzy Logic to Spatial Thermal Control in Fusion Welding**, Zafer Bingul, George E. Cook, Vanderbilt University, Nashville, TN, USA
- 15.2 2:30 pm **Intelligent Fusion Control Throughout Varying Thermal Region**, D.W. Hartman, D.R. DeLapp, R.J. Barnett, George Cook, Vanderbilt University, Nashville, TN, USA
- 15.3 3 pm **Load Speed Observer-Based Fuzzy Auto-Tuning Implementation for AC Speed Servo System with Two-Mass Mechanical Motion System Experimental Evaluation**, Junji Yoshitsugu, Kenil Inoue, Mutsuo Nakaoka, Yamaguchi University, Yamaguchi, JAPAN
- 15.4 3:30 pm **Parameterization and Compensation of Friction Forces Using Genetic Algorithm**, Hussain N. Al-Duwaish, King Fahd University of Petroleum & Minerals, Dhahran, SAUDI ARABIA
- 15.5 4 pm **DSP Based AC Drive Controller with Real-Time Complex Path Generation for Intelligent Motion Application**, F. Parasiliti, R. Petrella, Marco Tursini, University of L'Aquila, L'Aquila, ITALY
- 15.6 4:30 pm **Experimental Comparative Analysis of Conventional, Fuzzy Logic, and Adaptive Fuzzy Logic Controller: A Tutorial**, Foudr Mrad, American University of Beirut, New York, NY, USA
- 15.7 5 pm **A New Induction Motor Drive with Fuzzy Logic CR-PWM**, Carlo Cecati, University of L'Aquila, L'Aquila, ITALY

Session 16 - Monday, October 4 – Phoenix 9/10 Room
2 p.m.

POWER ELECTRONICS COMPONENTS AND DEVICES
IGBTs

Session Chair Peter Steimer, ABB Industrie AG, Turgi, SWITZERLAND
Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

- 16.1 2 pm **IGBT Model Validation for Soft Switching Applications**, David W. Berning, Allen R. Hefner, Jr., National Institute of Standards and Technology, Gaithersburg, MD, USA
- 16.2 2:30 pm **A New Punch Through IGBT Having a New N-Buffer Layer**, Hideo Iwamoto, Hideko Haraguchi, Yoshifumi Tomomatsu, Mitsubishi Electric Corporation, Fukuoka, JAPAN, John F. Donlon, Eric R. Motto, Powerex, Inc., Youngwood, PA, USA
- 16.3 3 pm **Pressure Contact IGBT: The Ideal Switch for High Power**, Frank Wakeman, G. Lockwood, M. Davies, K. Billett, Westcode Semiconductors Ltd, Chippenham Wiltshire, UNITED KINGDOM

16.4 3:30 pm **Switching Performances of 3.3KV HVIGBTs with PT and NPT Structures**, Kee-Ju Um, D.-S. Hyun, Hanyang University, Seoul, KOREA, B.-S. Seo, Fairchild Korea Semiconductor, Seoul, KOREA

16.5 4 pm **Evaluation of Planar and Trench IGBT for Hard- and Soft-Switching Performance**, M. Trivedi, Krishna Shenai, University of Illinois at Chicago, Chicago, IL, USA

16.6 4:30 pm **Switching Characteristics of NPT- and PT-IGBTs under Zero-Voltage**, B.-M. Song, H. Zhou, Jason Lai, Virginia Polytechnic Institute, Blacksburg, VA, USA, Allen R. Hefner, Jr., National Institute of Standards and Technology, Gaithersburg, MD, USA

16.7 5 pm **Power Loss and Junction Temperature Analysis of Power Semiconductor Devices**, Dewei Xu, Haiwei Lu, Lipei Huang, Tsinghua University, Beijing, CHINA, S. Azuma, M. Kimata, R. Uchida, Mitsubishi Electric Company, JAPAN

Tuesday Morning

**Session 17 - Tuesday, October 5 – Flagstaff 4/5 Room
8:30 a.m.**

ELECTROSTATIC PROCESSES Power Electronics and Measurements Techniques

Session Chair: N. Grass, Siemens AG, Erlangen, GERMANY

Organizer: W.D. Greason, University of Western Ontario, London, ONT, CANADA

17.1 8:30 am **Measurements of Tribo and Corona Charging Features of Materials for Assessment of Risks from Static Electricity**, John Chubb, John Chubb Instrumentation, Cheltenham, UNITED KINGDOM

17.2 9 am **Calibration of a Calorimeter for the Measurement of Electrostatic Discharge**, Z. Kucеровsky, W.D. Greason, M. Wm. Flatley, University of Western Ontario, London, ONT, CANADA

17.3 9:30 am **Study of Electrostatic Properties of Dielectric Surfaces and Powders Using Scanning Probe Microscopy**, W. Machowski, P. Barid, W. Balachandran, Brunel University, Uxbridge, Middlesex, UNITED KINGDOM

17.4 10 am **Optical Decoupling in Measurements of Corona Currents**, Z. Kucеровsky, W.D. Greason, T. Doyle, University of Western Ontario, London, ONT, CANADA

17.5 10 :30 am **A Novel Silent Discharge Type Ozonizer Using Pulse Density Modulated High Frequency Inverter**, Mutsuo Nakaoka, S. Wang, Y. Konish, Yamaguchi University, Yamaguchi, JAPAN

17.6 11 am **A High Voltage Pulsed Power System for Electrostatic Precipitators**, W. H. Kim, G.H. Rim, J.S. Kim, I. Kang, Korea Electrotechnology Research Institute, Kyungnam, KOREA

**Session 18 – Tuesday, October 5 – Phoenix 11/12 Room
8:30 a.m.**

INDUSTRIAL POWER CONVERTERS Utility Interface Issues and Rectifiers

Session Chair and Organizer: Herbert Hess, University of Idaho, Moscow, ID, USA

- 18.1 8:30 am **Opportunities for Harmonic Cancellation with Carrier Based PWM for Two-Level and Multi-Level Cascaded Inverters**, D.G. Holmes, B.P. McGrath, Monash University, Clayton, VIC, AUSTRALIA
- 18.2 9 am **An Intergrated Single-Switch Approach to Improve Harmonic Performance of Standard PWM Adjustable Speed Drives**, Steffan Hansen, Danfoss Drives A.S, Graasten, DENMARK, Prasad N. Enjeti, Texas A&M University, College Station, TX USA
- 18.3 9:30 am **Voltage-Phase Shifting Effect of Three-Phase Harmonic Canceling Reactors and Their Applications to Three-Level Diode Rectifiers**, K. Oguchi, G. Maeda, N. Hoshi, T. Kubota, Ibaraki University, Hitachi, JAPAN
- 18.4 10 am **A New Maximum Photo-Voltaic Power Tracking Control Scheme Based on Power Equilibrium at DC Link**, Mikihiko Matsui, Tokyo Institute of Polytechnics, Kanagawa, JAPAN
- 18.5 10:30 am **DC Ripple Current Reduciton on a Single-Phase PWM Voltage Source Rectifier**, Toshihisa Shimizu, Yasuhiro Jin, Gunji Kimiura, Tokyo Metropolitan University, Tokyo, JAPAN
- 18.6 11 am **Frequency Domain Analysis of Three Phase Linear Current Regulators**, D.N. Zmood, D.G. Holmes, G. Bode, Monash University, Clayton, AUSTRALIA
- 18.7 11:30 am **A Three Phase Series-Parallel Compensated Line-Interactive UPS System with Sinusoidal Input Current and Sinusoidal Output Voltage**, Sergio Augusta Oliveira da Silva, Pedro F. Donoso Garcia, Portifiro C. Cortizo, Federal University of Minas Gerais, Horizonte, BRAZIL

**Session 19 – Tuesday, October 5 – Flagstaff 1/2/3 Room
8:30 a.m.**

**ELECTRIC MACHINES
Synchronous Machines**

Session Chair and Organizer: Ron Harley, University of Natal, Durbin, SOUTH AFRICA

- 19.1 8:30 am **Rotors for Synchronous Reluctance Traction Motors: A Comparative Study**, Franco Leonardi, Patrick J. McCleer, Ahmed Elantably, McCleer Power, Inc., Jackson, MI, USA
- 19.2 9 am **Performance Comparison of SPM, IPM and SynRm Motors in Use as Air-Conditioning Compressor Motor**, Yukio Honda, Hiroyuki Kiriya, Shigeo Morimoto, Yoji Takeda, Matsushita Electric Industrial Co, Osaka, JAPAN
- 19.3 9:30 am **Comparison Study of Rotor Structures of Five-Phase Synchronous Reluctance Machines**, Longya Xu, Baoquo Wang, Ohio State University, Columbus, OH USA
- 19.4 10 am **The Brushless Doubly Fed Reluctance Machine and the Synchronous Reluctance Machine – A Comparison**, Robert E. Betz, M.G. Jovanovic, University of Newcastle, Callaghan, NSW, AUSTRALIA
- 19.5 10:30 am **Improvement of Synchronous Reluctance Motor Design through Finite-Element Analysis**, Alfredo Vagati, Aldo Canova, Mario Chiampi, Michele Pastorelli, Maurizio Repett, Politecnico di Torino, Torino, ITALY

19.6 11 am **Simplified Method for Optimizing Round-Rotor Synchronous Machines for Operation on Non-Sinusoidal Voltages**, Luis Alberto Pereira, Catholic University, BRAZIL

19.7 11:30 am **Determination of d and q Reactances of Permanent Magnet Synchronous Motors Without Measurements of the Rotor Position**, Hans-Peter Nee, Louis Lefevre, Peter Thelin, KTH, Royal Institute of Technology, Stockholm, SWEDEN

**Session 20 – Tuesday, October 5 – Phoenix 16/17/18 Room
8:30 a.m.**

**INDUSTRIAL DRIVES
Permanent Magnet and Induction Motor Drives II**

Session Chair: Ron Harley, University of Natal, Durban, SOUTH AFRICA

Session Organizer: Pat Jansen, General Electric Company, Schenectady, NY, USA

20.1 8:30 am **High Efficiency Adjustable Speed Control of IPMSM with Variable Permanent Magnet Flux Linkage**, Lei Ma, Masayuki Sanada, Shigeo Morimoto, Yoji Takeda, Osaka Prefecture University, Osaka, JAPAN

20.2 9 am **Analysis and Reduction of Acoustic Noise from a Brushless DC Drive**, Mark Brackley, Charles Pollock, University of Warwick, Coventry, UNITED KINGDOM

20.3 9:30 am **Drive Characteristics of Slotless PM Motors**, Takashi Kosaka, Nobuyuki Matsui, Nagoya Institute of Technology, Nagoya, JAPAN

20.4 10 am **A Stand-Still Method for Estimating the Rotor Resistance of Induction Motors**, Jens Godbersen, Danfoss Drives A/S, Graasten, DENMARK

20.5 10:30 am **On Line Estimation of the Stator Parameters in an Induction Motor Using Only Voltage and Current Measurements**, Juan Luis Zamora, Aurelio Garcia-Cerrada, Universidad Pontificia Comillas, Madrid, SPAIN

20.6 11 am **Experimental and Finite Element Analysis of an Electronic Pole-Change Drive**, Mohamed Osama, General Electric Company, Niskayuna, NY, USA, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI, USA

20.6 11:30 am **Integrated Drives as Single-Phase Motor Replacement**, N.P. Van Der Duijn, B.M. Gordon, R.A. McMahon, M.S. Boger, Cambridge University, Cambridge, UNITED KINGDOM

**Session 21 – Tuesday, October 5 – Prescott 8/9/10 Room
8:30 a.m.**

**METALS
Control, Design and Simulation for Drive, Power and Processing Line**

Session Chair: Lou Dreinhofer, ALCOA, Knoxville, TN, USA

Session Organizer: Remn-Min Guo, ARMCO Technical Center, Middletown, OH, USA

21.1 8:30 am **Applying Drive Performance Specifications to Systems Applications**, Brian T. Boulter, Rockwell Automation, Euclid, OH, USA

21.2 9 am **Design and Control of Multi-Span Tension Simulator**, Seung-Ho Song, Seung-Ki Sul, Seoul National University, Seoul, KOREA

21.3 9:30 a.m **New Intelligent Electronic Devices Change the Structure of Power Distribution Systems**, Tefvik Sezi, Siemens Power Transmission & Distribution, Raleigh, NC, USA

21.4 10 am **Innovative Substation Design - the Bay Controller Concept**, D. Proudfoot, Siemens, Wendell, NC, USA

21.5 10:30 a.m **Robust Observer-Based Control of an Aluminum Strip Processing Line**, Prabhakar Pagilla, Eugene King, Louis Dreinhofer, Srinivas Garimella, Oklahoma State University, Stillwater, OK, USA

21.6 11 am **Partial Discharge Theory and Technologies Related to Traditional Testing Methods of Large Rotating Apparatus**, Gabe Paoletti, Alexander Goubev. Cutler-Hammer, Pennsauken, NJ, USA

Session 22 – Tuesday, October 5 – Phoenix 13/14/15 Room
8:30 a.m.

POWER SYSTEMS ENGINEERING
Power Systems Reliability, Maintenance, Operation and Safety

Session Chair : Don Koval, IRAM Corp. Sherwood Park, ALB, CANADA

Session Organizer: William F. Braun, Owens Corning, Granville, OH, USA

22.1 8:30 am **Zone Branch Reliability Methodology for Analyzing Industrial Power Systems**, George I. Bocancea, Don O. Koval, University of Alberta, Sherwood Park, AB, CANADA

22.2 9 am **Analysis of Dynamic Load Behavior for Electrified Mass Rapid Transit Systems**, C.S. Chen, H.J. Chuang, J.L. Chen, National Sun Yat-Sen University, Kaohsiung, Taiwan, REPUBLIC OF CHINA

22.3 9:30 am **Managing Aviation Safety Through Information Technology**, William E. Larsen, Kevin Cooksey, John Zuk, Federal Aviation Administration, Moffett Field, CA, USA

22.4 10 am **Asynchronous motor Protection Against Dynamic Instabilities**, Willyams Pêna, José Beuses, Corpoven, S.A., Jorge Martinez, Carlos Dortolina, Haroldo Villamediana, INELECTRICA SA, Miami, FL , USA

Session 23 – Tuesday, October 5 – Prescott 6/7 Room
8:30 a.m.

INDUSTRIAL AUTOMATION AND CONTROL
Industrial Automatic Control Applications

Session Chair: Sam Hwang, Texas Instruments, Houston, TX, USA

Session Organizer: Omer Farook, Purdue University Calumet, Hammond, IN, USA

23.1 8:30 **Vector Modeling and Control of Unbalanced Electrical System**, C. B. Jacobina, M.B.R. Correa, T.M. Oliveira, A.M.N. Lima, E.R.C. da Silva, Universidade Federal Da Paraiba, Campina Grande, BRAZIL

- 23.2 9 am **Performance of Current Controller for VSI-Fed IPMSM Drive**, M.N. Uddin, T.S. Radwan, M. Azizur Rahman, Memorial University of Newfoundland, St. John's, NFL, CANADA
- 23.3 9:30 am **Electromechanical Re-adhesion Control Simulator for Inverter Driven Railway Electric Vehicle**, Woo-Seok Kim, Yong-Seok Kim, Jun-Koo Kang, Seung-Ki Sul, Seoul National University, Seoul, KOREA
- 23.4 10 am **Sensorless Control of PM Synchronous Motors at Zero Speed**, Alfio Consoli, F. Russo, G. Scarcella, A. Testa, University of Catania, Catania, ITALY
- 23.5 10:30 am **Experimental Verification of a Hybrid Fuzzy Controller for High Performance Brushless DC Motor Drives**, Ahmed Rubaai, Daniel Ricketts, M.D. Kankam, Howard University, Washington, DC, USA
- 23.6 11 am **Simulation of Series-Parallel Resonant DC-DC Converter System with DSP-Based Digital Control Scheme for Medical X-Ray Use**, Syed Mobin Ulhaq, Mutsuo Nakaoka, Hiroshi Takano, Yamaguchi University, Ube City, JAPAN
- 23.7 11:30 am **Microcomputer Control of a Motor Drive System**, George Perdikaris, University of Wisconsin-Parkside, Kenosha, WI, USA

**Session 24 – Tuesday, October 5 – Phoenix 19/20 Room
8:30 a.m.**

**POWER ELECTRONICS DEVICES AND COMPONENTS
IGCTs and Power MOS**

Session Chair: David W. Borst, Consultant, Palos Verdes, CA, USA

Session Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

- 24.1 8:30 am **Evaluation of a High Power ARCP Voltage Source Inverter with IGCTs**, Steffen Bernet, ABB Corporate Research, Heidelberg, GERMANY, P.K. Steimer, ABB Industrie AG, Tujrgi, SWITZERLAND
- 24.2 9 am **Characteristics and Utilization of a New Class of Low-on-Resistance MOS Gated Power Devices**, Jason Lai, B.-M. Song, H. Zhou, N. Nguyen. Virginia Polytechnic Institute, Blacksburg, VA, USA; Allen R. Jefner, Jr., D.W. Berning, C-C. Chen, National Institute of Standards and Technology, Gaithersburg, MD, USA
- 24.3 9:30 am **A Compact Model for Depletion MOSFETs in Smart Power Applications**, Lutz Goehler, Universitaet der Bundeswhr Muenchen, Neubiberg, GERMANY, K. Kelting, Siemens AG, Munich, GERMANY
- 24.4 10 am **Unclamped Inductive Switching Dynamics in Lateral and Vertical DMOSFETs**, K. Chinnaswamy, P. Khandelwal, M. Trivedi, Krishna Shenai, University of Illinois at Chicago, Chicago, IL, USA
- 24.5 10:30 am **Input and Reverse Transfer Capacitance Measurement of MOS-Gated Power Transistors under High Current Flow**, Christopher Deml, Siemens AG Semiconductor Group, Munich, GERMANY
- 24.6 11 am **Dynamic SOA of Power MOSFETs**, N. Keskar, M. Trivedi, Krishna Shenai, University of Illinois at Chicago, Chicago, IL, USA

Tuesday Afternoon

Session 25 – Tuesday, October 5 – Flagstaff 4/5 Room

2 pm

ELECTROSTATIC PROCESSES

Discharge Reactors

Session Chair: John Chubb, John Chubb Instrumentation, Cheltenham, UNITED KINGDOM

Session Organizer: T. Oda, University of Tokoyo, JAPAN

25.1 2 pm **Comparison of Reactor Performance in the Non-Thermal Plasma Processing of Hazardous Air Pollutants**, S. Futamura, H. Einaga, Z. Zhang, National Institute for Resources and Environment, Ibaraki, JAPAN

25.2 2:30 pm **Diesel Engine Exhaust Cleanup with a Pulsed Streamer Corona Reactor Equipped with Reticulated Vitreous Carbon Electrodes**, B.R. Locke, Akira Mizuno, A. Ichihashi, Toyohashi University of Technology, Aichi, JAPAN

25.3 3 pm **Neutralization Theory of Static Surface Charges by an Ionizer Under Wide Gas Pressure Environments**, J. S. Chang, McMaster University, Hamilton, ONT, CANADA

25.4 3:30 pm **Micro Reactors Based on Water-in-Oil Emulsion**, S. Katsura, A. Yamaguchi, N. Harada, K. Hirano, A. Mizuno, Toyohashi University of Technology, Toyohashi, JAPAN

25.5 4 pm **Development of High Collection Efficiency ESP by Barrier Discharge System**, Y. Kawada, T. Kubo, A. Zukeran, Y. Ehara, T. Ito, T. Takahashi, H. Kawakami, T. Takematsu, Musashi Institute of Technology, Tokyo, JAPAN

25.6 4:30 pm **Removal of C₂F₆ from Semiconductor Process Flue Gases by Ferro-Electric Packed Bed-Barrier Discharge Reactor-Adsorbent Hybrid Systems**, K. Urashima, K.G. Kostov, J. S. Chang, McMaster University, Hamilton, ONT, CANADA

25.7 5 pm **Heavy Oil Conversion by Plasma Chemical Reactors**, G. Prieto, O. Prieto, C.R. Gay, M. Okumoto, K. Shimano, A. Mizuno, Toyohashi University of Technology, Toyohashi, JAPAN

Session 26 – Tuesday, October 5 – Phoenix 11/12 Room

2 pm

INDUSTRIAL POWER CONVERTERS

Multi Level and Matrix Power Converters

Session Chair: Victor Stefanovic, Consultant, Afton, VA, USA

Session Organizer: Giri Venkataramanan, Montana State University, Bozeman, MT, USA

26.1 2 pm **A Single Phase Matrix Down-Converter for Airport Lighting Regulation**, James Galloway, J H Galloway and Associates, Brookfield, CT, USA, Douglas Giardini, Cooper Industries, USA

26.2 2:30 pm **ARCPI Resonant Snubber for the Neutral-Point-Clamped (NPC) Inverter**, Xiaoming Yuan, Swiss Federal Institute of Technology, Zurich, SWITZERLAND, Ivo Barbi, University of Santa Catarina, Florianapolis, BRAZIL

26.3 3 pm **A New Boost Type Rectifier for a DC Power Supply with Frequent Output Short Circuit**, Eui-Cheol Nho, In-Dong Kim, Pukyong National University, Pusan, KOREA, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI, USA

26.4 3:30 pm **A Fast Space Vector Modulation Algorithm for Three-Phase Multilevel Converters**, Nikola Celanovic, Dushan Boroyevich, Virginia Polytechnic Institute, Blacksburg, VA, USA

26.5 4 pm **Voltage-Fed NPC Soft-Switching Inverter with New Space Voltage Vector Modulation Scheme**, M. Yamamoto, E. Hiraki, M. Nakaoka, Yamaguchi, JAPAN

26.6 4:30 pm **Performance of Medium Voltage Source Inverters**, Walter A. Hill, General Electric Industrial Systems, Salem, VA, USA

26.7 5 pm **Three-Level Inverter-Fed Synchronous Motor Drive System**, Amr A. Amin, Communication College, Jeddah, SAUDI ARABIA

**Session 27 – Tuesday, October 5 – Flagstaff 1/2/3 Room
2 pm**

**ELECTRIC MACHINES
Actuators and Special Machines**

Session Chair: Pete Wung, Emerson Motor Co., St. Louis, MO, USA

Session Organizer: Bruno Lequesne, GM R&D Center, Warren, MI, USA

27.1 2 pm **A Novel Compact PMSM with Magnetic Bearing for Artificial Heart Application**, J. X. Shen, K.J. Tseng, W.K. Chan, Nanyang Technological University, Nanyang, SINGAPORE

27.2 2:30 pm **Performance Comparison of U-Core and Round Stator Single Phase Permanent Magnet Motors for Pump Applications**, Vlado Ostovic, Hochschule fur Technik und Wirtschaft, Saarbrucken, GERMANY

27.3 3 pm **Extended-Range Linear Magnetostrictive Motor with Double-Sided Three-Phase Stators**, Won-jong Kim, Massachusetts Institute of Technology, Cambridge, MA, USA, James H. Godie, Michael J. Gerver, SatCon Technology Corporation, Cambridge, MA, USA

27.4 3:30 pm **Development of Homo-Polar Type Bearingless Motors**, Osamu Ichikawa, Akira Chiba, Tadashi Fukao, Tokyo Institute of Technology, Tokyo, JAPAN

27.5 4 pm **Low Cost Brushless Generators**, L. McGrow, C. Pollock, University of Warwick, Coventry, UNITED KINGDOM

27.6 4:30 pm **Minimization of Torque Pulsations in a Trapezoidal Back-EMF Permanent Magnet Brushless DC Motor**, Sunil Murthy, Benoit Derouane, Buyun Liu, Tomy Sebastian, GM Delphi Saginaw Steering Systems, Saginaw, MI, USA

**Session 28 – Tuesday, October 5 – Phoenix 16/17/18 Room
2 pm**

**INDUSTRIAL DRIVES
Vector Controlled Motor Drives**

Session Chair: Mahesh Swamy, Yaskawa Electric America, Northbrook, IL, USA

Session Organizer: Fred Brockhurst, Rose-Hulman Institute of Technology, Terre Haute, IN, USA

28.1 2 pm **Comparison of Field-Oriented Control and Direct Torque Control for Induction Motor Drives**, Hoang Le-Huy, Laval University, Ste-Foy, QUE, CANADA

28.2 2:30 pm **Rotor Field-Oriented Control with Adaptive Iron Loss Compensation**, H. Rasmussen, P. Vadstrup, H. Borsting, Aalborg University, Aalborg, DENMARK

28.3 3 pm **A Speed Sensorless Vector Control of Induction Motor Operating at High Efficiency Taking Core Loss into Account**, Shotaro Taniguchi, Tatsuya Yoshizumi, Kazushige Namiki, Kouki Matsuse, Meiji University School of Science, Kanagawa, JAPAN

28.4 3:30 pm **Robust Speed Estimation for Speed Sensorless Vector Control of Induction Motors**, Sang-uk Kim, Iee-Woo Yang, Young-Bong Kim, Jong-Tai Lee, Young-Seok Kim, Inha Technical Junior College, Incheon, KOREA

28.5 4 pm **A New Rotor Time Constant Update Rule Using Stator Flux Vector of an Induction Motor**, Gubae Kang, Jinhwan Jung, Kwanghee Nam, Postech University, Pohang, KOREA

28.6 4:30 pm **Automatic Commissioning for Vector Controlled AC Motors using Walsh Functions**, Hyun-Sung Choi, Seung-Ki Sul, Seoul National University, Seoul, KOREA

Session 29– Tuesday, October 5 – Prescott 8/9/10 Room
2 pm

METALS
Control, Design and Simulation in Metal Industry

Session Chair: William Pruss, US Steel, Braddock, PA, USA

Session Organizer: Remn-Min Guo, ARMCO Technical Center, Middletown, OH USA

29.1 2 pm **Blast Furnace Burden Detector**, Howard Gerber, Pinakin Chaubal, Purdue University, Calumet, Hammond, IN, USA

29.2 2:30 pm **Effects of Main Transformer Replacement on the Performance of an Electric Arc Furnace System**, Alper Akdag, Chiba Institute of Technology, Chiba, JAPAN and Metu Information Technologies and Electronics Research Institute, Ankara, TURKEY, Isik Cadirci, Erbil Nalcaci, Muammer Ermis, Susumu Tadakuma, Chiba Institute of Technology, Chiba, JAPAN, Tubi Tak, Metu Information Technologies and Electronics Rsearch Institute, Ankara, TURKEY

29.3 3 pm **On the Influence of Coil Design and Electromagnetic Configuration on the Efficiency of an Induction Melting**, P. Dorland, J.Daan Van Wyk, O.H. Stielau, Rand Afrikaans University, Johannesburg, SOUTH AFRICA

29.4 3:30 pm **Radiation Efficiency of Ar Torch Short Plasma as Function of Length near 100A**, Toru Iwao, Masao Endo, Tsuginori Inaba, Chuo University, Tokyo, JAPAN

29.5 4 pm **Sensitivity Analysis of an LQ Optimal Multi-Variable Controller for a Fine Coal Injection Vessel**, Wolfgang Birk, Alexander Medvedev, Lulea University of Technology, Lulea, SWEDEN

29.6 4:30 pm **Detection of Incipient Clogging in Pulverized Coal Injection Lines**, Andreas Johansson, Alexander Medvedev, Lulea University of Technology, Lulea, SWEDEN,

Session 30 – Tuesday, October 5 – Phoenix 13/14/15 Room
2 pm

POWER SYSTEMS ENGINEERING
Power Systems Design and Analysis

Session Chairs: Suresh Kapoor, Montgomery Village, MD, USA

Session Organizers: Peter Southerland, GE Power Systems, Schenectady, NY, USA

30.1 2 pm **Dynamic Sag Correctors: Cost Effective Industrial Power Line Conditioning**, W. Brumsickle, R. Schneider, G. Luckjiff, D. Divan, M. McGranaghan, Soft Switching Technologies, Middleton, WI, USA

30.2 2:30 pm **The Effect of Quantization and Sampling Time on Transformers Thermal Performance and Parameters Calculations**, D.J. Tylavsky, Q. He, S. Si, Arizona State University, Tempe, AZ, USA, G.A. McCulla, J.R. Hunt, Salt River Project, Tempe, AZ, USA

30.3 3 pm **Prediction of Magnetic Fields in Multiconductor Systems with Significant Harmonic Currents**, Francesco Profumo, M. Tartaglia, M. Carrescia, Politecnico di Torino, Torino, ITALY

30.4 3:30 pm **Understanding the Unbalanced Voltage Problem in Wind Turbine Generation**, E. Muljadi, T. Batan, C.P. Butterfield, D. Yildirim, NREL, Golden, CO, USA

30.5 4:00 pm **Industrial Power System Analysis with Database Access**, Jen-Hung Chen, Point Comfort, Tx, USA

Session 31 – Tuesday, October 5 – Prescott 6/7 Room
2 pm

INDUSTRIAL AUTOMATION AND CONTROL
Industrial Process Controls II

Session Chair: Zakariya Al-Hamouz, King Fahd University of Petroleum and Minerals, Daharan, SAUDI ARABIA

Session Organizer: Donald S. Zinger, Northern Illinois University, DeKalb, IL, USA

31.1 2 pm **Acceleration Feedback Control Strategy for Improving Riding Quality of Elevator**, Young-Min Lee, Jun-Koo Kang, Seung-Ki Sul, Seoul National University, Seoul, KOREA

31.2 2:30 pm **PLC Based Ignition System**, H.D. Dongargaonkar, R. G. Jamkar, "Pragoja", Nanded, INDIA

31.3 3 pm **Dynamic Analysis of Center-Driven Web Winder Controls**, Zhijun Liu, Rockwell Automation, Mequon, WI, USA

31.4 3:30 pm **Pattern Recognition Technique for Real-Time Diagnosis of Bioprocesses**, Tokoi Hamrita, Shu Wang, University of Georgia, Athens, GA, USA

31.5 4 pm **Parallel Modeling of the IGBT Electrothermal Behavior**, Nacer-eddine Benhissen, Adam Skorek, Ahmed Lakhsasi, Univ. du Quebec a Trois-Rivieres, Trois Rivieres, QUE, CANADA

Session 32 – Tuesday, October 5 – Phoenix 19/20 Room
2 pm

POWER ELECTRONICS DEVICES AND COMPONENTS
Integration, Packaging and Reliability

Session Chair: Dennis H. Braun, Rockwell Automation, Mequon, WI, USA
Session Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

32.1 2 pm **Some Limitations of Integrated LCT Modules for Resonant Converters at 1 MHz**, J.T. Strydom, J.Daan Van Wyk, Rand Afrikaans University, Johannesburg, SOUTH AFRICA, J.A. Ferreira, Delft University of Technology, Delft, THE NETHERLANDS,

32.2 2:30 pm **Dealing with Uncertainty in Power Loss Estimates in Thermal Design of Power Electronics Circuits**, Shri Sridhar, Philips Research Laboratories, Briarcliff Manor, NY, USA

32.3 3 pm **On-Line Thermal Model and Thermal Management Strategy of a Three-Phase Voltage Source Inverter**, Richard Lukaszewski, Vladimir Blasco, Ray Sladky, Rockwell Automation, Mequon, WI, USA

32.4 3:30 pm **Switching Cell Design with EMC and Commutation Losses Criteria**, M. Akhbari, J.L. Schanen, R. Perret, Lab. d'Electronique de Grenoble, Grenoble, FRANCE

32.5 4 pm **Thermal Design and Characterization of IGBT Six-Pack Power Modules**, Jun He, V. Mehrotra, M.C. Shaw, Rockwell Science Center, Thousand Oaks, CA, USA

32.6 4:30 pm **Converter Layout Parasitic Extractions and Modeling: Continuation of a Systematic Approach**, J.D. Van Wyk, W. A. Cronje, Rand Afrikaans University, Johannesburg, SOUTH AFRICA

32.7 5 pm **Localization of Electrical Insulation and Partial Discharge Failures of IGBT Modules**, G. Mitic, G. Lefranc, Siemens AG, Munich, GERMANY

Wednesday Morning

Session 33 – Wednesday, October 6 – Flagstaff 4/5 Room
8:30 a.m.

ELECTROSTATIC PROCESSES
Plasma Chemical Processes

Session Chair: M. Rea, University of Padova, Padova, ITALY
Session Organizer: A. Mizuno, Toyohashi University of Technology, Toyohashi, JAPAN

33.1 8:30 am **OH Radical Generation During Non-Thermal Plasma Processing Observed by a LIF Method**, R. Ono, Tetsuji Oda, University of Tokyo, Tokyo, JAPAN

33.2 9 am **Removal of Dilute Benzene Using Zolite-Hybrid Plasma Reactor**, Atsushi Ogata, D. Ito, K. Mizuno, S. Kushiyama, T. Yamamoto, National Institute for Resources, Ibaraki, JAPAN

33.3 9:30 am **OH Radical Generation by Atmospheric Pressure Plasma and its Quantitative Analysis by Monitoring CO Oxidation**, A. Mizuno, Z. Su, H. Kim, K. Takashima, S. Katsura, Toyohashi University of Technology, Toyohashi, JAPAN

33.4 10 am The Influence of Reaction Conditions on SO₂ Oxidation in a Discharge Plasma Reactor, A. Mizuno, C.W. Wu, Y. Fujiyama, K. Takashima, S. Katsura, H.H. Kim, Toyohashi University of Technology, Toyohashi, JAPAN

33.5 10:30 am **Electric Air Cleaner Composed of Non-Thermal Plasma Reactor and Electrostatic Precipitator**, M. Okubo, T. Yamamoto, T. Kuroki, H. Fukumoto, Osaka Prefecture University, Osaka, JAPAN

33.6 11 am **Decomposition of Trichloroethylene by Non-Thermal Plasma with Catalysts**, T. Oda, T. Takahashi, S. Kohzuma, The University of Tokyo, Tokyo, JAPAN

33.7 11:30 am **Towards Ideal Nox Control Technology Using Plasma Chemical Hybrid Process**, T. Yamamoto, M. Okubo, K. Hayakawa, K. Kitaura, Osaka Prefecture University, Osaka, JAPAN

**Session 34 – Wednesday, October 6 – Phoenix 11/12 Room
8:30 a.m.**

**INDUSTRIAL POWER CONVERTERS
Special Session on Medium Voltage Drives**

Session Chair and Organizer: Andy Stevenson, Robicon, Pittsburgh, PA, USA

34.1 8:30 am **A Reliable, Interface-Friendly Medium Voltage Drive Based on the Robust IGCT and DTC Technologies**, Peter Steimer, J.K. Steinke, S. Conner, ABB Industries AG, Turgie, SWITZERLAND

34.2 9 am **New Medium Voltage Drive System Using Three-Level Neutral Point Clamped Inverter with High Voltage IGBT**, R. Sommer, Alex Mertens, M. Griggs, H.-J. Conraths, M. Bruckmann, T. Greif, Siemens AG, Erlangen, GERMANY

34.3 9:30 am **Innovation IGCT Main Drives**, J.P. Lyons, V. Vlatkovic, GE Corporate R&D, Schenectady, NY, USA, P.M. Espelage, F.H. Boettner, GE Industrial Systems, Salem, VA, USA, E. Larsen, GE Power Systems Engineering, Schenectady, NY, USA

34.4 10 am **A Medium-Voltage Drive Utilizing Series-Cell Multilevel Topology for Outstanding Power Quality**, Richard H. Osman, Robicon, Pittsburgh, PA, USA

34.5 10:30 am **Hybrid Multilevel Power Conversion System: A Competitive Solution for High Power Applications**, Madhav Manjrekar, Richard Lund, Thomas A. Lipo, University of Wisconsin- Madison, Madison, WI, USA, Peter Steimer, ABB Industries AG, Turgie, SWITZERLAND

34.6 10:30 am **A New Neutral Point Current Control for a 3-Level Converter/Inverter Pair System**, Yo-Han Lee, Bum-Seok Suh, Dong-Seok Hyun, Hanyang University, Seoul, KOREA

34.7 11 am **Gate Drive Power Recover and Regenerative Snubber Scheme for Series-Connected GTO's in High-Voltage Inverters**, J. Holtz, Robert Rosner, University of Wuppertal, Wuppertal, GERMANY

**Session 35 – Wednesday, October 6 – Flagstaff 1/2/3 Room
8:30 a.m.**

**ELECTRIC MACHINES
Induction Machines II: Performance**

Session Chair: Cathy McClay, University of Cambridge, Cambridge, UNITED KINGDOM

Session Organizer: Hamit Toliyat, Texas A&M University, College Station, TX, USA

35.1 8:30 am **An Air Gap Flux Oriented Vector Controller for Stable Magnetic Suspension during High Torque Acceleration in Bearingless Induction Motors**, Akira Chiba, Takahiro Suzuki, Kazuhisa Yoshida, Tadashi Fukao, Science University of Tokyo, Tokyo, JAPAN

35.2 9:am **Induction Motor High Frequency Model**, Aldo Boglietti, E. Carpaneto, Politecnico di Torino, Torino, ITALY

35.3 9:30 am **An Estimation Method of Starting Performance of Squirrel-Cage Induction Motor on DC Decay Testing Method**, Hiroshi Asano, Shu Yamamoto, Takahiro Ara, Shoichi Oda, Kouki Matsuse, Tokyo Polytechnic College, Tokyo, JAPAN

35.4 10 am **Sensorless Decoupling Control of Induction Motors for High Dynamic Performance**, Cheng-Hung Tsai, Hung-Ching Lu, Tatung Institute of Technology, Taipei, Taiwan, REPUBLIC OF CHINA

35.5 10:30am **PWM-VSI Inverter Assisted Dual Winding Induction Generator**, Olorunfemi Ojo, Tennessee Tech University, Cookeville, TN, USA, Innocent E. Davidson, University of Pretoria, Pretoria, SOUTH AFRICA

**Session 36 – Wednesday, October 6 – Phoenix 16/17/18 Room
8:30 a.m.**

**INDUSTRIAL DRIVES
Design of Electrical Drives I**

Session Chair: Victor Stefanovic, Consultant, Afton, VA, USA

Session Organizer: Ojo Olorunfemi, Tennessee Technological University, Cookeville, TN, USA

36.1 8:30 am **Generation and Suppression of Conducted EMI from Inverter Motor Drives**, Shaotang Chen, Delphi Automotive systems, Warren, MI, USA

36.2 9 am **Electromagnetic Compatibility Design for a 19 MW PWM Motor Drive**, Allan Crane, Timothy J. McCoy, Integrated Power Systems Program Office, Arlington, VA, USA

36.3 9:30 am **Motor Shaft Voltages Reduction Method Modifying the Distribution of Zero Voltage Vector in PWM Converter-Inverter System**, Hyeoun-Dong Lee, Seung-Ki Sul, Seoul National University, Seoul, KOREA

36.4 10 AM **Motor Shaft Voltage and Bearing Currents and their Reduction in Multi-Level Medium Voltage PWM Voltage Source Inverter Drive Applications**, F. Wang, GE Industrial Systems, Salem, VA, USA

36.5 10:30 am **Model-Based Loss Minimization for DC and Vector Controlled AC Motors Including Core Saturation**, Fidel Fernandez-Bernal, Aurelio Garcia-Cerrada, Roberto Faure, Universidad Pontificia Comillas de Madrid, Madrid, SPAIN

36.6 11 am **Novel Space Vector Based Harmonic Elimination Inverter Control**, Sidney Robert Bowes, S. Grewal, University of Bristol, Bristol, UNITED KINGDOM

36.7 11:30 am **An Approach to Achieve Ride-Through of an Adjustable Speed Drive with Supercapacitor Modules**, Jose L. Duran-Gomez, Prasad Enjeti, Texas A&M University, College Station, TX, USA, Annette von Jouanne, Oregon State University, Corvallis, OR, USA

**Session 37 – Wednesday, October 6 – Prescott 8/9/10 Room
8:30 a.m.**

**INDUSTRIAL POWER CONVERTERS
DC Power Conversion I**

Session Chair: Subrahmanya Ramakrishnan, Princeton University, Princeton, NJ, USA
Session Organizer: Dushan Borojevic, Virginia Polytechnic Institute, Blacksburg, VA, USA

37.1 8:30 am **Switched Inductor Four-Quadrant DC/DC Luo-Converter**, Fang L. Luo, Hong Ye, Nanyang Technological University, Singapore, SINGAPORE, Muhammad H. Rashid, University of West Florida, Pensacola, FL, USA

37.2 9 am **Simplified Control Technique for High-Power-Factor Flyback, Cuk and Sepic Rectifiers Operating in CCM**, G. Spiazzi, S. Buso, University of Padova, Padova, ITALY. D. Tagliavia, ST Microelectronics, Catania, ITALY

37.3 9:30 am **On the Reliability of DC-DC Converters**, Neeraj Keskar, Malay Trivedi, Krishna Shenai, University of Illinois at Chicago, Chicago, IL, USA

37.4 10 am **Stability Study of PC Power System**, Pit-Leong Wong, Fred C. Lee, Xunwei Zhou, Virginia Polytechnic Institute, Blacksburg, VA, USA

37.5 10:30 am **Switched Capacitor Four-Quadrant DC/DC Luo-Converter**, Fang L. Luo, Hong Ye, Nanyang Technological University, Singapore, SINGAPORE, Muhammed H. Rashid, University of West Florida, Pensacola, FL, USA

37.6 11 am **Digital Burst Technique in the Stand-By Operation of a TV Power Supply**, A. I. Maswood, Nanyang Technological University, SINGAPORE, Zee Kum Yoong, Thompson Multimedia Asia PTE. Ltd., SINGAPORE

37.7 11:30 am **VRM Transient Modeling and Analysis**, Pit-Leong Wong, Fred C. Lee, Xunwei Zhou, Jiabin Chen, Virginia Polytechnic Institute, Blacksburg, VA, USA

**Session 38 – Wednesday, October 6 – Phoenix 13/14/15 Room
8:30 a.m.**

**PRODUCTION AND APPLICATION OF LIGHT
Lighting Systems and Lamp Modelling**

Session Chair: W. Kaiser, Universidade de Sao Paulo, Sao Paulo, BRAZIL
Session Organizer: F.P. Dawson, University of Toronto, Toronto, ONT, CANADA

38.1 8:30 am **Compensating Power Measurement Phase Delay Error**, James Lester, Benjamin Alexandrovich, GTE Products Corp., Salem, MA, USA

38.2 9 am **A Fuzzy Logic Controlled Single-Stage Converter for PV Powered Lighting System Applications**, T. F. Wu, C-H Chang, Y-K Chen, Virginia Polytechnic Institute, Blacksburg, VA, USA

38.3 10 am **Optical Wireless Based on High Brightness Visible LEDs**, Grantham Pang, Thomas Kwan, Hugh Liu, Chi-Ho Chen, The University of Hong Kong, HONG KONG

38.4 10:30 am **Low Voltage Dimming System**, Jenkin Hua, Leviton Manufacturing, Little Neck, NY, USA

**Session 39– Wednesday October 6 – Prescott 6/7 Room
8:30 a.m.**

**INDUSTRIAL AUTOMATION AND CONTROL
Measurements, Sensors and Injection Modeling**

Session Chair: M. David Kankan, NASA Lewis Research Center, Cleveland, OH, USA

Session Organizer: Takoi K. Hamrita, University of Georgia, Athens, GA, USA

39.1 8:30 am **An Investigation to General Characteristics of Impulse Magnetizer (I)- Circuit, Thermal and Cost Modeling of Impluse Magnetizer**, Pill-Soo Kim, Y. Kim, Daelim College, Kyunggi, KOREA, Byungyou Hong, Sungyunkwan, KOREA

39.2 9 am **An Investigation to General Characteristics of Impulse Magnetizer (II) - Field Modeling and Thermal Modeling of Magnetizing Fixture**, Pill-Soo Kim, Y. Kim, Daelim College, Kyunggi, KOREA, Byungyou Hong, Sungyunkwan, KOREA

39.3 9:30 am **Determining the Displacement Power Factor Using a Discrete Fourier Transform under Nonsiusoidal Conditions**, G. Haarhoff, I. Hofsaler, J.D. Van Wyk, Rand Afrikaans University, Johannesburg, SOUTH AFRICA

39.4 10 am **Notch Filter Tuning for Resonant Frequency Reduction in Dual Inertia Systems**, Peter B. Schmidt, Thomas Rehm, Rockwell Automation, Milwaukee, WI, USA

39.5 10:30 am **Accelerometer for Mobile Robot Positioning**, Hugh Liu, Grantham Pang, The University of Hong Kong, HONG KONG

39.6 11 am **Fabric Defect Detection by Fourier Analysis**, Chi-ho Chan, G. Pang, T. Kwan, The University of Hong Kong, HONG KONG

39.7 11:30 am **Sub-Micron Positon Sensor with a Fiber-Optic Interferometer**, Y. Nagalke, Guanming Lai, Y. Wu, H. Ikeda, Shizuoka University, Hamamatsu, JAPAN

**Session 40 – Wednesday, October 6 – Phoenix 19/20 Room
8:30 a.m.**

**POWER ELECTRONICS DEVICES AND COMPONENTS
Modules**

Session Chair: Richard A. Lukaszewski, Rockwell Automation, Mequon, WI, USA

Session Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

40.1 8:30 am **Original Cabling Conditions to Insure Balanced Current During Switching Transitions Between Parallel Semiconductors**, P.O. Jeannin, J.L. Schanen, E. Clavel, Laboratoire d'Electronique de Grenoble, Grenoble, FRANCE

- 40.2 9 am **A New Packaging Technique for Power Multichip Modules**, C. Gillot, D. Henry, C. Schaeffer, Laboratoire d'Electrotechnique de Grenoble, Grenoble, FRANCE
- 40.3 9:30 am **6.5 KV IGBT Modules**, J. Goertert, H. Hierholzer, R. Spanke, eupec GmbH and Company KG, Warstein, GERMANY
- 40.4 10 am **Behavior of IGBT Modules Under Short Circuit Conditions**, R. Palmer, H.S. Rajamani, Cambridge University, Cambridge, UNITED KINGDOM
- 40.5 10:30 am **Analysis and Measurement of Chip Current Imbalance Caused by Structure of Busbars in an EGBT Module**, Takeshi Ohi, T. Horiguti, T. Okuda, T. Kikunaga, Mitsubishi Electric Corporation, Hyogo, JAPAN
- 40.6 11 am **Optimization of Microchannels Heat Sinks Realized in Silicon Technology**, Corinne Perret, J. Boussey, C. Schaeffer, Laboratoire d'Electrotechnique de Grenoble, Grenoble, FRANCE
- 40.7 11:30 am **Third Generation of 1200 V IGBT Modules**, M. Muenzer, H. Hierholzer, eupec GmbH and Company KG, Warstein, GERMANY

Wednesday Afternoon

Session 41 – Wednesday, October 6 – Flagstaff 4/5 Room
2 pm

ELECTROSTATIC PROCESSES **Liquids and Electrohydrodynamics**

Session Chair: J. Bryan, Outokumpu Copper, Franklin, KY, USA

Session Organizer: S.J. Yagoobi, Texas A&M University, College Station, TX, USA

- 41.1 2 pm **Force of Attraction Between Two Conducting Droplets in Electric Field**, Kazimierz Adamiak, University of Western Ontario, London, ONT, CANADA
- 41.2 2:30 pm **Electrohydrodynamic Induction Pumping of a Stratified Liquid/Vapor Medium in the Presence of Volumetric and Interface Electric Charges**, M. Wawzyniak, J. Seyed-Yagoobi, Texas A&M University, College Station, TX, USA
- 41.3 3 pm **The Electric Field at a Conductive Liquid Surface Stressed by an AC Voltage**, J. A. Robinson, M.A. Bergougnou, G.S.P. Castle, I.I. Inculet, The University of Western Ontario, London, ONT, CANADA
- 41.4 3:30 pm **Electrohydrodynamics of Water Droplets on Polymeric Surfaces**, R. Sundararajan, S. Sundhar, T. Asokan, Arizona State University East, Mesa, AZ, USA
- 41.5 4 pm **Vibration of a Water Droplet Located on a Hydrophobic Sheet Under the Tangential AC Field**, Y. Higashiyama, S. Yanase, T. Sugimoto, Yamagata University, Yonezawa, JAPAN
- 41.6 4:30 pm **Motion of a Conductive Particle in Viscous Fluid Simulating Liquefied Plastic Waste**, C. Choi, K. Yatsuzuka, K. Asano, Yamagata University, Yamagata-ken, JAPAN
- 41.7 5 pm **On the Charge of a Moving Particle Within Parallel Electrodes in Viscous Fluid**, K. Yatsuzuka, C. Choi, K. Asano, Yamagata University, Yamagata-ken, JAPAN

Session 42 – Wednesday, October 6 – Phoenix 11/12 Room
2 pm.

INDUSTRIAL POWER CONVERTERS
Rectifier and Inverter Technology

Session Chair: James H. Galloway, J.H. Galloway & Associates, Brookfield, CT, USA

Session Organizer: Malik Elbuluk, University of Akron, Akron, OH, USA

42.1 2 pm **High Efficiency Class AD Audio Amplifier for a Wide Range of Input Signals**, A.E. Ginart, R.M. Bass, W.M. Leache, Georgia Institute of Technology, Atlanta, GA, USA

42.2 2:30 pm **Common Mode Currents Elimination in Multi-Drive Industrial Systems**, Alfio Consoli, Mario Cacciato, Giuseppe Scarcella, University of Catania, Catania, ITALY, Antonio Testa, University of Messina, Messina, ITALY

42.3 3 pm **Active Common-Mode Filter for Inverter Power Supplies with Unbalanced and Nonlinear Load**, Zhihong Ye, Dushan Boroyevich, Jun Xing, Fred C. Lee, Changrong Liu, Virginia Polytechnic Institute, Blacksburg, VA, USA

42.4 3:30 pm **Adaptive Commutation and 3-in-1 IBPM for Medium Power AC-AC Converters**, Jie Chang, Rockwell Science Center, Thousand Oaks, CA, USA, Dennis Braun, Allen-Bradley, Rockwell Automation, Mequon, WI USA

42.5 4 pm **Application of MTO-Thyristors in Current Stiff Converters with Resonant Snubbers**, Braz J. Cardoso Filho, Universidade Federal de Minas Gerais, Horizonte, BRAZIL, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI USA

42.6 4:30 pm **Modeling Based Examination of Conducted EMI Emissions from Hard-and-Soft-Switching PWM Inverters**, Hubin Zhu, Yuqing Tang, Jason Lai, Virginia Polytechnic Institute & State University, Blacksburg, VA, USA, Allen R. Hefner Jr., National Institute of Standards and Technology, Gaithersburg, MD, USA

42.7 5 pm **Photovoltaic Inverter Systems with Self-Tuning Fuzzy control Based on an Experimental Planning Method**, T. F. Wu, C.H. Yang, Y.K. Chen, Z.R. Liu, Virginia Polytechnic Institute, Blacksburg, VA, USA

Session 43 – Wednesday, October 6 – Flagstaff 1/2/3 Room
2 pm

ELECTRIC MACHINES
Induction Machines III: Testing and Diagnosis

Session Chair: Ahmad El-Antably, Allision Transmission, Indianapolis, IN, USA

Session Organizer: Tom Nondahl, Rockwell Automation, Milwaukee, WI, USA

43.1 2 pm **Statistical Energy Analysis of Acoustic Noise and Vibration for Electric Motors: Transmission from Airgap Field to Motor Frame**, Koen Delaere, Paul Sas, Ward Heylen, Ronnie Belmans, Kay Hameyer, Katholieke Universiteit Leuven, Leuven, , BELGIUM

43.2 2:30 pm **Detection of AC Machine Winding Deterioration Using Electrically Excited Vibrations**, F.C. Trutt, J. Sottle, J. L. Kohler, University of Kentucky, Lexington, KY, USA

43.3 3 pm **Stator Fault Diagnosis in Induction Motors Using Power Decomposition**, M. Arkan, P. J. Unsworth, University of Sussex, Brighton, UNITED KINGDOM

43.4 3:30 pm **Closed Loop Control Impact on the Diagnosis of Induction Motors Faults**, A. Bellini, F. Flippetti, G. Franceschini, C. Tassoni, Università di Parma, Parma, ITALY

43.5 4 pm **Study of Three Phase Induction Motors with Incipient Rotor Cage Faults Under Different Supply Conditions**, Hamid Toliyat, Texas A&M University, College Station, TX, USA

43.6 4:30 pm **Rotor Cage Fault Diagnosis in Three-Phase Induction Motors by the Total Instantaneous Power Spectral Analysis**, S.M.A. Cruz, A. J Marques Cardoso, Universidade de Coimbra, Coimbra, PORTUGAL

43.7 5 pm **Comparative Investigation of Diagnostic Media for Induction Motors: A Case of Rotor Cage Faults**, Andrezej Trzynadlowski, Ewan Ritchie, University of Nevada-Reno, Reno, NV, USA

Session 44 – Wednesday, October 6 – Phoenix 16/17/18 Room
2 pm

INDUSTRIAL DRIVES
Design of Electrical Drives II

Session Chair: Michael Giesselmann, Texas Tech University, Lubbock, TX,, USA

Session Organizer: Tony O’Gorman, Motorola, Inc., Northbrook, IL, USA

44.1 2 pm **A Reduced Switch Dual-Bridge Inverter Topology for the Mitigation of Bearing Currents, EMI and DC-Link Voltage Variations**, Haoran Zhang, Annette Von Jouanne, Oregon State University, Corvallis, OR, USA

44.2 2:30 pm **Novel PWM Scheme to Control Neutral Point Voltage Variation in Three-Level Voltage Source Inverter**, K.R.M.N. Ratnayake, Y. Murai, T. Watanabe, Gifu University, Gifu-shi, JAPAN

44.3 3 pm **Performance of a SCR-Inverter-Based Commutator-less Series Motor with Load Commutation and Unaided Start-up Capability**, Sabyasachi S. Gupta, Ajit K. Chattopadhyay, Bengal Engineering College (DU), Howrah, INDIA

44.4 3:30 pm **Analysis of a Novel Four-Level dc/dc Boost Converter**, Keith Corzine, Sonal Majeetha, University of Wisconsin - Milwaukee, Milwaukee, WI, USA

44.5 4 pm **A New Modular Motor-Modular Inverter (MM-MI) Concept for Medium Voltage Adjustable Speed Drive Systems**, E. Cengelci, Prasad Enjeti, W. Gray, Texas A&M University, College Station, TX, USA

44.6 4:30 pm **Brushless DC Drives without Magnets**, C. Pollock, M.A. Wallace, J.D. Wale, University of Warwick, Coventry, UNITED KINGDOM

44.7 5 pm **Adjustable Speed Synchronous Motors, Part 1: System Harmonic Reduction**, Miguel Villablanca, Jose Abarca, Carlos Cuevas, Andrea Valencia, Wilson Rojas, Santiago University of Chile, Santiago, CHILE

Session 45 – Wednesday, October 6 – Prescott 8/9/10 Room
2 pm

INDUSTRIAL POWER CONVERTERS

High Frequency Power Conversion

Session Chair: William E. Brumsickle, Soft Switching Technologies, Middleton, WI, USA
Session Organizer: Edison R. C. da Silva, University of Paraiba, Campina Grande, BRAZIL

45.1 2 pm **A Quasi Resonant DC-Link PWM Inverter for Induction Motor Drive,**
J.J. Jafar, B.G. Fernandes, Indian Institute of Technology, Bombay, INDIA

45.2 2:30 pm **A Novel Two-Quadrant Soft-Switching Converter with One Auxillary Switch for High Power Applications,** Byeong-Mun Song, Jason Lai, Virginia Polytechnic Institute, Blacksburg, VA, USA

45.3 3 pm **Test and Characterization Setup for High Power Semiconductor Devices Under Hard and Soft-Switching,** Renato O. C. Lyra, Vinod John, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI, USA, Braz J. Cardoso Filho, Universidade Federal de Minas Gerais, Belo Horizonte, BRAZIL

45.4 3:30 pm **PWM Control of Three-Phase Series Resonant DC Link Converters for UPS Applications,** M.N. Maxwell, Ali Keyhani, Ohio State University, Columbus, OH, USA

45.5 4 pm **Output Characteristics of a New Series Resonant DC Link AC/AC PWM Converter,** Hiroki Ishikawa, Yoshihiro Murai, Gifu University, Gifu, JAPAN

45.6 4:30 pm **A New Soft-Switched Quasi-Single-Stage (QSS) Bi-Directional Inverter/Charger,** Kunrong Wang, Celestica Corp, Johnson City, NY USA, Fred C. Lee, Wei Dong, Virginia Polytechnic Institute, Blacksburg, VA, USA

45.7 5 pm **Design of an IGBT-based LCL-Resonant Inverter for High-Frequency Induction Heating,** Sibylle Dieckerhoff, Michael J. Ryan, Rik De Doncker, Aachen Institute for Power Electronics and Electrical Drives, Aachen, GERMANY,

Session 46 – Wednesday, October 6 – Phoenix 13/14/15 Room
2 pm

PRODUCTION AND APPLICATION OF LIGHT

Ballast-on-a-Chip: Realistic Expectation or Technical Delusion

PANEL

Discussion Leader: Matthias Radecker, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systems, Duisburg, GERMANY

Panelists:

Claudio Contiero, SGS-Thompson, ST Microelectronics, Agrate, ITALY
Rob J. Fronen, Phillips Semiconductors BV, Nimegen, THE NETHERLANDS
Horst Knoedgen, DIALOG Semiconductor GmbH, Kirchheim/Teck-Nabern, GERMANY
David Martini, MagneTek, ITALY
Norbert Primisser, Tridonic-Bauelemente GmbH, Dornbirn, AUSTRIA
Thomas Ribarich, International Rectifier, El Segundo, CA, USA
Ihor Wacyk, Phillips Research, Briarcliff Manor, NY, USA

Session 47– Wednesday, October 6 – Prescott 6/7 Room
2 pm

ENERGY SYSTEMS

Energy Systems

Session Chair : Dick Lennig, Keller & Gannon, San Francisco, CA, USA

Session Organizer: Greg Nolan, Fluor Daniel, Marlton, NJ, USA

47.1 2 pm Economic Analysis for Demand-Side **Hybrid Photovoltaic and Battery Energy Storage System**, Chin-E Lin, Wei-Fu Su, S.J. Huang, National Cheng-Kung University, Tainan, Taiwan, REPUBLIC OF CHINA

47.2 2:30 pm **Design of Protective Scheme for Tie Line Tripping of an Industrial Cogeneration System**, C.T. Hsu, C.S. Chen, Y.D. Lee, J.F. Huang, H.S. Chen, R.T. Hsu, C.B. Huang, National Sun Yat-Sen University, Kaohsiung, Taiwan, REPUBLIC OF CHINA

47.3 3 pm **An Adaptive Microcomputer Based Load Shedding Relay**, K. K. Li, Z. Zhang, X.G. Yin, Y.H. Zhang, D.S. Chen, The Hong Kong Polytechnic University, Kowloon, HONG KONG

47.4 3:30 pm **Adjustment of the External Network's Measurements and its Effect on the Power Mismatch Analysis**, R. C. Leou, C.N. Lu, Rong-Ceng Leou, Yung Ta Junior College of Tech. and Commerce, Ping Tong, Taiwan, REPUBLIC OF CHINA

47.5 4 pm **Wind Driven Self-Excited Induction Generator with Simple Decoupled Excitation Control**, V. Agarwal, S. Wekhande, Indian Institute of Technology, Bombay, INDIA

47.6 4:30 pm **A Battery Management System for Stand Alone Photovoltaic Energy System**, Syed Islam, S. Duryea, W.B. Lawrence, Curtin University of Technology, Perth, AUSTRALIA

Session 48 – Wednesday, October 6 – Phoenix 19/20 Room
2 pm

POWER ELECTRONIC DEVICES AND COMPONENTS

Magnetics

Session Chair: W.G. Odendaal, Philips Research Laboratories, Brianclyff, Manor, NY, USA

Session Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

48.1 2 pm **Calculation of Losses in Ferro- and Ferrimagnetic Materials Based on the Modified Steinmetz Equation**, Juergen Reinert, Rik De Doncker, Aachen University of Technology, Aachen, GERMANY, A. Brockmeyer, Siemens AG, Erlangen, GERMANY

48.2 2:30 pm **Winding Loss Calculation with Multiple Windings, Arbitrary Waveforms and Two-Dimensional Field Geometry**, Charles R. Sullivan, Dartmouth College, Hanover, NH, USA

48.3 3 pm **Representing Electrical Behavior of Transformers by Lumped Element Circuits: Global Physical Approach**, J.P. Keradec, Ambroise Schellmanns, J.L. Schanen, K. Berrouche, Laboratoire d'Electronique de Grenoble, Grenoble, FRANCE

48.4 3:30 pm **Loss Modeling for Planar Inductors**, T.G. Imre, W.A. Cronje, J.D. Van Wyk, Rand Afrikaans University, Johannesburg, SOUTH AFRICA, J.A. Ferreira, Delft University of Technology, Delft, THE NETHERLANDS

48.5 4 pm **A Method to Charge and Discharge High Current Energy Storage Coils**, E. van Dijk, Royal Netherlands Navy, The Hague, THE NETHERLANDS, J.A. Ferreira,

Delft University of Technology, Delft, THE NETHERLANDS, P. van Gelder, Pulse Physics Laboratory, Delft, THE NETHERLANDS

48.6 4:30 pm **HOKA: A New Isolated Current Measuring Principle and its Features**, Nicolai Karrer, Swiss Federal Institute of Technology, Zurich, SWITZERLAND, Patrick Hofer-Noser, Atlantis Solar Systems, Bern, SWITZERLAND, Daniel Henrard, LEM SA, Grand-Lancy, SWITZERLAND

48.7 5 pm **An Accurate Experimental Apparatus for Measuring Losses in Magnetic Components**, Shri Sridhar, R.M. Wolf, W.G. Odendaal, Philips Research Laboratories, Briarcliff Manor, NY, USA

Thursday Morning

**Session 49 – Thursday, October 7 – Flagstaff 4/5 Room
8:30 a.m.**

ELECTROSTATIC PROCESSES Particles and Power Technology

Session Chair: K. Robinson, Eastman Kodak Company, Rochester, NY, USA

Session Organizer: L. Dascalecu, Institut Universitare de Tehnologie, Angouleme, FRANCE

49.1 8:30 am **Efficiency of Electrostatic Separation of Minerals from Coal as a Function of Size and Charge Distribution of Coal Particles**, K.B. Tennal, M. K. Mazumder, D. Lindquist, R. Rajan, J. Joseph, University of Arkansas, Little Rock, AR, USA

49.2 9 am **Distribution of Electric Field Strength Around a Large Scale Charged Particles Cloud**, T. Sugimoto, S. Doi, M. Takahashi, Y. Higashiyama, Yamagata University, Yonezawa, JAPAN

49.3 9:30 am **Computational Estimation of ESD Conditions Between Configurations of Electrostatic Processes Applications**, L. Dascalescu, P. Ribradiere, J.M. Palliot, R. Allam, CNRS Laboratoire d'Electrostatique, Grenoble, FRANCE

49.4 10 am **Tribocharging on Toner Particles with Carrier in Two-Component Developer**, Y. Nakamura, Y. Terao, Y. Suzuki, T. Sekine, Nippon Institute of Technology, Saitama, JAPAN

**Session 50 – Thursday, October 7 – Phoenix 11/12 Room
8:30 a.m.**

INDUSTRIAL POWER CONVERTERS Control and Modelling of Power Converters

Session Chair and Organizer: William A. Peterson, Lockheed Martin Control Systems, Johnson City, NY, USSA

50.1 8:30 am **A New Phase Detecting Method for Power Conversion Systems Considering Distorted Conditions in Power System**, Jun-Koo Kang, Seung-Ki Sul, Seoul National University, Seoul, KOREA

50.2 9 am **Modeling and Control of Unbalanced Three-Phase Systems Containing PWM Converters**, C. B. Jacobina, E.R.C. da Silva, A.M.N. Lima, Universidade Federal Da Paraiba, Paraiba, BRAZIL, M.B.R. Correa, Escola Tecnica Federal de Alagoas, Campina Grande, BRAZIL, R.F. Pinheiro, University Federal do Rio Grande do Norte, BRAZIL

- 50.3 9:30 am **Small Signal Stability for Single Phase Inverter Connected to Stiff AC System**, Ernane A. Alves Coelho, Federal University of Uberlandia, BRAZIL; Porfirio Cabale Cortizo, Pedro Donoso Garcia, Federal University of Minas Gerais, Belo Horizonte, BRAZIL
- 50.4 10 am **A Novel Dead Time Minimization Algorithm for the PWM Inverter**, Jung-Soo Choi, Ji-Yong Yoo, Seung-Won Lim, Young-Seok Kim, Inha University, Incheon, KOREA
- 50.5 10:30 pm **Modeling and Control of PWM Voltage Source Rectifier with a Buck-Boost Characteristic in its Output**, Shoji Fukuda, Tomomichi Ito, Hokkaido University, Sapporo, JAPAN
- 50.6 11 am **Virtual-Sensor-Based Control of PWM Current Source Rectifiers**, Jose R. Espinoza, Ernesto Araya, Daniel Sbarbaro, Universidad de Concepcion, Concepcion, CHILE, Geza Joos, Concordia University, Montreal, QUE, CANADA
- 50.7 11:30 am **Modified Deadbeat Digital Controller for UPS with 3-Phase PWM Inverter**, Seung-Yo Lee, Jun-Seok Cho, Hyung-Soo Mok, Gyu-Ha Choe, Konkuk University, Seoul, KOREA

**Session 51 – Thursday, October 7 – Flagstaff 1/2/3 Room
8:30 a.m.**

**ELECTRIC MACHINES
Reluctance Machines**

Session Chair: Alfredo Vagati, Politecnico di Tornio, Tornio, ITALY

Session Organizer: Mike Boyer, Edwards High Vacuum International, Shoreham-by-Sea, UNITED KINGDOM

- 51.1 8:30 am **Modeling of a Saturated Switched Reluctance Motor Using an Operating Point Analysis and the Unsaturated Torque Equation**, N.J. Nagel, Robert Lorenz, University of Wisconsin-Madison, Madison, WI, USA
- 51.2 9 am **Effect of Mutual Inductance on Steady-State Performance and Position Estimation of Switched Reluctance Motor Drive**, Debiprasad Panda, V. Ramanarayanan, Indian Institute of Science, Bangalore, INDIA
- 51.3 9:30 am **2D FEA of a High Force Density Linear Switched Reluctance Machine Including 3D Effects**, Uday Deshpande, Globe Motors, Dayton, OH, USA
- 51.4 10 am **Radial Force Calculation and Acoustic Noise Prediction in Switched Reluctance Machines**, M.N. Anwar, Iqbal Husain, University of Akron, Akron, OH, USA
- 51.5 10:30 am **Radial Force Characteristics of Switched Reluctance Machines**, Neil R. Garrigan, Wen L. Soong, Charles M. Stephens, GE Corporate R&D Center, Niskayuna, NY, USA, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI, USA
- 51.6 11 am **Design Consideration of Switched Reluctance Motors: Vibration and Control Issues**, B. Fahimi, G. Suresh, Merhdad Ehsani, Texas A&M University, College Station, TX, USA
- 51.7 11:30 am **Design of a Linear Switched Reluctance Machine**, Byeong-Seok Lee, Han-Kyung Bae, Praveen Vijayraghavan, R. Krishnan, Virginia Polytechnic Institute, Blacksburg, VA, USA

**Session 52 – Thursday October 7 – Phoenix 16/17/18 Room
8:30 a.m.**

**INDUSTRIAL DRIVES
Sensorless Control Methods for Motor Drive Systems**

Session Chair: B.K. Bose, University of Tennessee, Knoxville TN, USA

Session Organizer: Alfredo Vagati, Politecnico di Torino, Torino, ITALY

52.1 8:30 am **Adaptive Sliding Mode Observer for Speed Sensorless Control of Induction Motors**, F. Parasiliti, R. Petrella, Marco Tursini, University of L'Aquila, L'Aquila, ITALY

52.2 9 am **A New Approach to Vector Control for a Linear Induction Motor Considering End Effect**, Jeong-Hyoun Sung, Kwanghee Nam, Postech University, Pohang, KOREA

52.3 9:30 am **A New Zero Frequency Flux Position Detection Approach for Direct Field Oriented Control Drives**, Alfio Consoli, Giuseppe Scarcella, Antonio Testa, University of Catania, Catania, ITALY

52.4 10 am **Analysis of Sensorless Linear Compressor Using Linear Pulse Motor**, Masayuki Sanada, Shigeo Morimoto, Yoji Takeda, Osaka Prefecture University, Osaka, JAPAN

52.5 10:30 am **Speed Sensorless Direct Torque Control of Induction Motors Using Adaptive Flux Observer**, Jehudi Maes, Jan Melkebeek, RUG-ELMAPE, Gent, BELGIUM

52.6 11 am **Dynamic Operation of Carrier Signal Injection-Based, Sensorless, Direct Field Oriented AC Drives**, F. Briz, A.B. Diez, University of Oviedo, Gijon, SPAIN

52.7 11:30 am **Sensorless Vector-Controlled Induction Machine Drives with Fast Stator Voltage Offset Compensation**, Hisao Kubota, Yukio Kataoka, Kouki Matsuse, Meiji University, Kawasaki, JAPAN

**Session 53 – Thursday, October 7 – Phoenix 13/14/15 Room
8:30 a.m.**

**POWER SYSTEMS PROTECTION
Power Systems Protection**

Session Chair and Organizer: Raymond D. Valentine, Consultant, Murrysville, PA, USA

53.1 8:30 am **North American or IEC Standards for Circuit Breakers; What is the Choice for North America?**, George Gregory, Square D Co., Cedar Rapids, IA, USA

53.2 9 am **A Power Line Conditioner Based on Flying Capacitor Multilevel Voltage Source Converter with Phase Shift SPWM**, Yiqiao Liang, Chika Nwanka, ALSTOM Drives and Controls, Pittsburgh, PA, USA

53.3 10 am **Remote Monitoring of Circuit Breakers**, J.C. Engel, J.L. Lagree, D.M. Oravetz, W. Murphy, Cutler-Hammer Technical Center, Pittsburgh, PA, USA

53.4 10:30 am **Time Coordination Method for Power System Protection by Evolutionary Algorithm**, Gilbert K.K. Li, Hong Kong Polytechnic University, Kowloon, HONG KONG

Session 54 – Thursday, October 7 – Prescott 6/7 Room

8:30 a.m.

**INDUSTRIAL AUTOMATION AND CONTROL
Industrial Adaptive Control Applications**

Session Chair: Hiroaki Ikeda, Seikoh Giken Co., Ltd., Chiba, JAPAN

Session Organizer: Adam Skorek, CANEL Technologies Inc., Trois-Rivieres, QUE. CANADA

54.1 8:30 am **A Combined Field Orientation and Adaptive Backstepping for Induction Motor Control**, Hualin Tan, Jie Chang, Rockwell Science Center, Thousand Oaks, CA, USA

54.2 9 am **Parallel Computation of Continually Fast On-line Random Trained Neural Networks for Identification and Control of Induction Motors**, Ahmed Rubaai, Raj Kotaru, M.D. Kankam, Howard University, Washington, DC, USA

54.3 9:30 am **Computer-Aided Commissioning of Speed and Position Control for Electrical Drives with Identification of Mechanical**, H. Wertz, S. Beineke, N. Frohleke, Silverio Bolognani, K. Unterkofler, M. Zigliotto, M. Zordan, University of Padenborn, Padenborn, GERMANY

54.4 10 am **A Neural Network-Based Positional Tracking Controller for Servo Systems**, Prasanna Boyagoda, Mutsuo Nakaoka, Yamaguchi University, Yamaguchi, JAPAN

54.5 10:30 am **Adaptation Learning Control Scheme for a High Performance Permanent Magnet Stepper Motor Using On-Line Random Training of Neural Networks**, Ahmed Rubaai, Raj Kotaru, Howard University, Washington, DC, USA

54.6 11 am **Adaptive Voltage Control in Fusion Arc Welding**, Poolsak Koseeyaporn, George E. Cook, Alvin M. Strauss, Vanderbilt University, Nashville, TN, USA

Session 55 – Thursday, October 7 – Phoenix 19/20 Room

8:30 a.m.

**POWER ELECTRONICS COMPONENTS AND DEVICES
Capacitors**

Session Chair: James L. Stevens, Philips Components, Columbia, SC, USA

Session Organizer: William M. Portnoy, Texas Tech University, Lubbock, TX, USA

55.1 8:30 am **Current Handling Evaluations and Non-Shorting Feature of Multilayer Polymer Capacitors**, I.W. Clelland, ITW Paktron, Lynchburg, VA, USA

55.2 9 am **Using a Debye Polarization Cell to Predict Double-Layer Capacitance Performance**, R. M. Nelms, D.R. Cahela, B.J. Tatarchuk, Auburn University, Auburn, AL, USA

55.3 9:30 am **Thermal Modeling of Aluminum Electrolytic Capacitors**, Sam Parler, Jr., Cornell Dubilier, Inc., Liberty, SC, USA

55.4 10 am **Current Sharing Between Diode Clamps of Polar Capacitor Bank Capacitor as a Storage Element**, E. van Dijk, Royal Netherlands Navy, The Hague, THE NETHERLANDS, J.A. Ferreira, Delft University of Technology, Delft, THE NETHERLANDS, P. van Gelder, Pulse Physics Laboratory, Delft, THE NETHERLANDS

55.5 10:30 am **Capacitor Measurement Systems for Power Electronics Applications**, J.T. Strydom, J.D. Van Wyk, Rand Afrikaans University, Johannesburg, SOUTH AFRICA, J.A. Ferreira, Delft University of Technology, Delft, THE NETHERLANDS

55.6 11 am **The Application of Aluminum Electrolytic Capacitors Constructed with an Electrochemical Cathode in Power Electronics**, Martin Hudis, Aerovox, Inc., New Bedford, MA, USA

55.7 11:30 am **Experimental 400 KWsec Double-Layer Capacitor Energy Storage System**, Luis Zubieta, R. Bonert, University of Toronto, Toronto, ONT, CANADA

Thursday Afternoon

**Session 56 – Thursday, October 7 – Flagstaff 4/5/ Room
2 pm**

ELECTROSTATIC PROCESSES Precipitation, Separation and Spraying

Session Chair: J.F. Hughes, University of Southampton, Southampton, UNITED KINGDOM
Session Organizer: K. Robinson, Eastman Kodak, Rochester, NY, USA

56.1 2 pm **Fuzzy Logic-Optimizing IGBT Inverter for Electrostatic Precipitators**, N. Grass, Siemens AG, Erlangen, GERMANY

56.2 2:30 pm **Prototyping of an Expert System for Electrostatic Separation Processes**, M. Mihailescu, A. Samuila, A. Iuga, L. Dascalescu, CNRS Laboratoire d'Electrostatique, Grenoble, FRANCE

56.3 3 pm **Positioning and Levitation of Media for Separation of Biological Cells: A Separation Method**, W. M. Arnold, Gracefield Research Center, Lower Hutt, NEW ZEALAND

56.4 3:30 pm **Effect of Conductivity on the Spraying of Dielectric Liquids**, D. K. Davies, Markab, Pear Trees, Lymington, Hants, UNITED KINGDOM

56.5 4 pm **The Properties of the Needle-Ring Shaped DC Ion Airflow Generator**, H. Zhao, J. Qu, University of Western Ontario, London, ONT, CANADA

56.6 4:30 pm **Formation of Ceramic Thin Films Using Electrospray in Cone-Jet Mode**, P. Miao, W. Balachandran, P. Xiao, Brunel University, Uxbridge, Middlesex, UNITED KINGDOM

**Session 57 – Thursday, October 7 – Phoenix 11/12 Room
2 pm**

INDUSTRIAL POWER CONVERTERS DC Power Conversion II

Session Chair: Robert N. Guenther, NWL Transformers, Bordentown, NJ, USA
Session Organizer: Dushan Borojevic, Virginia Polytechnic Institute, Blacksburg, VA, USA

57.1 2 pm **Delta-Delta-Three-Phase Boost Power Factor Correction Circuit Operating in Discontinuous Conduction Mode**, Dan Carlton, William G. Dunford, University of British Columbia, Vancouver, B.C, CANADA, Mark Edmunds, Xantrex Technology, Inc., CANADA

57.2 2:30 pm **A General Constant Frequency PFC Controller for Three-Phase Boost Rectifiers Part 1- with Parallel-Connected Dual boost Sub-Topologies**, Chongming Qiao, Keyue M. Smedley, University of California at Irvine, Irvine, CA, USA

57.3 3 PM **A General Constant Frequency PFC Controller for Three-Phase Boost Rectifiers Part 2 - with Series - Connected Dual Boost Sub-Topologies**, Chongming Qiao, Keyue M. Smedley, University of California at Irvine, Irvine, CA, USA

57.4 3:30 PM **State-Variable Equation Based Simulation of Active PFC Converter System with Digital Control Scheme**, Syed Mobin Ulhaq, Mutsuo Nakaoka, Yamaguchi University, Ube City, JAPAN, Hiroshi Takano, Hitachi Medical Co., JAPAN

57.5 4 PM **Resonant-Boost-Input Three-Phase Power Factor Corrector Using IGBT Switching Condition**, De Feng Weng, Matsushita Electric Works, JAPAN, Subbaraya Yuvarajan, North Dakota State University, Fargo, ND, USA

57.6 4:30 PM **The Design of Duty-Cycle Modulated Three-Phase Boost Rectifiers**, Domingos Simonetti, Mauricio C. Azevedo, Jose Luis F. Veira, Federal University of Espirito Santo, Vitoria, BRAZIL; Joost Peeter Rey, Noordelijke Hogeschool Leeuwarden

**Session 58 – Thursday, October 7 – Flagstaff 1/2/3 Room
2 pm**

**ELECTRIC MACHINES
PM Machines II: Performance and Control**

Session Chair: James Kokernak, RPI, Troy, NY, USA

Session Organizer: Fabio Crescimbin, University of Rome, Rome, ITALY

58.1 2 pm **Novel Dual-Excitation Permanent Magnet Vernier Machine**, Akio Toba, Thomas A. Lipo, University of Wisconsin-Madison, Madison, WI, USA

58.2 2:30 pm **A Novel Solid-State-Commutator PM Motor Arrangement for EV Application**, F. Caricchi, F. Crescimbin, F. Giullli Capponi, L. Solero, University of Rome, Rome, ITALY

58.3 3 pm **Axial Flux Interior PM Synchronous Motor: Parameters Identification and Steady-State Performance Measurements**, Francesco Profumo, M. Lazzari, A. Tenconi, A. Cavagnino, Politecnico di Torino, Torino, ITALY

58.4 3:30 pm **A Self-Sensing Homopolar Magnetic Bearing: Analysis and Experimental Results**, Perry Tsao, Seth Sanders. UC Berkeley, Berkeley, CA, USA

58.5 4 pm **Optimal Control of Permanent-Magnet AC Machine Drives with a Novel Multiple Reference Frame Synchronous Estimator/Regulator**, P.L. Chapman, Scott D. Sudhoff, Purdue University, West Lafayette, IN, USA

58.6 4:30 pm **Prediction of Starting Performance of PM Motor by DC Decay Testing Method**, Shu Yamamoto, Takahiro Ara, Shoichi Oda, Kouki Matsuse, Polytechnic University, Sagamihara, Kanagawa, JAPAN

58.7 5 pm **Modeling the Dynamic Behavior of Single-Phase Line-Start Permanent Magnet Motors**, A. M. Knight, J.C. Salmon, University of Alberta, Sherwood Park, AB, CANADA

**Session 59 – Thursday, October 7 – Phoenix 16/17/18 Room
2 p.m.**

**INDUSTRIAL DRIVES
Analysis and Control Methods for Motor Drive Systems**

Session Chair: Alfio Consoli, University of Catania, Catania, ITALY

Session Organizer: Hamid Toliyat, Texas A&M University, College Station, USA

59.1 2 pm **Complex Rotating Vector Methods for Smooth Torque Control of a Saturated Switched Reluctance Motor**, N.J. Nagel, Robert Lorenz, University of Wisconsin-Madison, Madison, WI, USA

59.2 2:30 pm **Comparison of Motion Control Loops for Industrial Applications**, George Ellis, Kollmorgen Corporation, Radford, VA USA; Robert D. Lorenz, University of Wisconsin-Madison, Madison, WI, USA

59.3 3 pm **Virtual Vectors Based Predictive Control of Torque and Flux of Induction Motor and Speed Sensorless Drives**, Jie Chen, Yongdong Li, Tsinghua University, Beijing, CHINA

59.4 3:30 pm **A Neural Network Based Space Vector PWM Controller for Voltage Fed Inverter Induction Motor Drive**, Joao O.P. Pinto, Bimal K. Bose, Luiz E. Borges, University of Tennessee, Knoxville, TN USA, Marian P. Kazmierkowski, Institute of Control and Industrial Electronics, Warsaw, POLAND

59.5 4 pm **Decoupled Control of Active and Reactive Power for a Grid-Connected Doubly-Fed Wound Rotor Induction Machine without Position Sensors**, Rajib Datta, V.T. Ranganathan, Indian Institute of Science, Bangalore, INDIA

59.6 4:30 pm **Analysis of a Wide Speed Range Starter/Alternator System Based on a Novel Converter Topology for Electronic Series/Parallel Stator Winding Configuration**, Johann W. Kolar, R.S. Wieser, H. Ertl, Technical University Vienna, Vienna, AUSTRIA

59.7 5 pm **Web-Based Virtual Engineering Laboratory (VE-LAB) for a Hybrid Electric Vehicle Starter/Alternator**, Raymond Sepe, Jr., Nathan Short, Electro Standards Lab., Inc., Cranston, RI, USA

1999 IEEE IAS CONFERENCE AND ANNUAL MEETING

October 3-7, 1999 – PHOENIX CIVIC PLAZA, PHOENIX, AZ

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