

IEEE Power Engineering Society
2005 Annual Report by Technical Committee on
Power System Analysis, Computing and Analysis (PSACE)

Chair: Chen-Ching Liu, University of Washington
Vice Chair: Roger Dugan, EPRI

1. Significant accomplishments in 2005

- PSACE organized a total of 14 panel sessions at the 2005 General Meeting of the Power Engineering Society in San Francisco, CA. The subject areas cover state-of-the-art and high interest topics in the areas of power market economics, risk / reliability and probability applications, computing and analytic methods, intelligent system applications, and distribution system analysis. All sessions were well attended.
- PSACE revised IEEE Standard 762, “IEEE Standard definitions for use in reporting electric generating unit reliability, availability and productivity.”
- A total of 90 proceedings papers within the scope of PSACE were reviewed and presented at the 2005 General Meeting.
- PSACE provided a tutorial at the 2005 General Meeting on “Electric delivery system reliability evaluation.”
- PSACE is a primary technical co-sponsor for the IEEE PES/CIGRE Symposium in October 2005, San Antonio, TX. The theme of the symposium was “Congestion Management in a Market Environment.” PSACE was responsible for inviting and reviewing papers and chairing sessions.
- PSACE is the technical co-sponsor of the 13th International Conference on “Intelligent System Applications to Power Systems (ISAP) ” that was held in Arlington, VA, in November 2005. The 2005 ISAP includes 90 technical papers from 18 countries as well as 6 tutorial papers that will be available through IEEE Explore Data Base. PSACE played a leadership role in the organization and the technical program.

2. Benefits to industry and PES members

- The PSACE panel sessions provide a forum for PES members concerning subjects within the scope of PSACE and of great interest to the PES members. Panelists are experts in the subject areas invited by the PSACE session organizers.

- IEEE Standard 762 has been heavily referenced by the industry.
- As reliability gains greater attention by the industry and the PES community, the tutorial course on reliability was timely and critical.
- Lively discussions that took place at the PSACE panel sessions benefited the PES membership through the exchange of ideas and state of the art discussions.

3. Benefits to volunteer participants

- The organizers of the panel sessions and the panelists attracted attention from the PES membership and interest in their work.
- Task force and working group activities involve numerous members that were able to play a leadership role in PSACE technical activities.
- Volunteers were provided professional development opportunities through task force and working group activities, technical paper reviews, and participation in expert panels.

4. Recognition of outstanding performance

- Working Group on IEEE Standard 762 received the 2005 PSACE Working Group Recognition Award, Chair: Andy Ford, PJM Interconnection.
- Roger Dugan, EPRI, received the 2005 PSACE Technical Committee Distinguished Service Award.
- 2005 PSACE Technical Committee Prize Paper Award was presented to Andrew L. Ott's for his paper, "Experience with PJM Market Operation, System Design, and Implementation, *IEEE Transactions on Power Systems*, May 2003. (Andrew Ott is with PJM Interconnection.)

5. Significant plan for 2006

PSACE plays a leadership role in shaping the future of the technical activities within our scope. At the PSACE Technical Committee Meeting during 2005 General Meeting, PSACE had a road-mapping session that identifies the important areas for the future development of the PSACE community:

- Cyber security
- State estimation for very large grids
- Homeland security
- Market monitoring
- New reliability issues and standards

- New IT technologies
- Incentives for transmission investment
- Multi-agent models

We will incorporate the results of the road-mapping discussions in our activities in 2006 and beyond.

The panel session ideas that are being developed for 2006 include:

- Standard market terms involving FERC
- Generating unit performance in de-regulated environment, new revised standard, application and commercial availability
- Balanced flexible and diversified energy portfolio
- Prevention and mitigation of cascading scenarios and blackouts
- High speed computation to power problems
- LMP in practice
- Open source software applications
- Power grid cyber security
- Utility applications of intelligent systems
- Concepts and approaches in multi-agent systems for power engineering application
- Intelligent data mining and analysis for the solution of power system problems
- Intelligent techniques for power system generation control
- Intelligent systems for economic operation of power systems
- Induction motor test cases
- Advanced models for distribution system analysis

6. Problems and concerns

- We have a serious concern about the short time available for General Meeting paper reviewers to submit their reviews. The review of a large number of papers within the scope of PSACE is a great challenge. We recommend that the time line be reviewed and revised to allow more time for the reviewers and TCPCs to compile the results in order to maintain high quality of the papers to be presented at the General Meeting.
- We need to make a strong effort in inviting greater participation from the power industry, particularly power companies. PSACE already has strong representation from vendors and universities.

More specifics of this report can be found in the Appendix, where the annual reports of the five subcommittees of PSACE are included.

APPENDIX:

2005 Annual Reports of the Five PSACE Subcommittees

1. Subcommittee on Power System Economics

Chair: Ross Baldick, University of Texas, Austin

Significant Accomplishments in 2005:

This sub-committee sponsored four panel sessions at the 2005 PES General meeting, all of which were extremely well attended. There were about 75 attendees at the “Engineering and Economic Reliability Criteria for Transmission System Operation” panel session. There were over 50 attendees at the “Integrating Market and System Operations” panel session. There were about 50 attendees at the “Market Models, Behavior & Monitoring a Step Beyond” panel session. There were about 50 attendees at the “Inter-Regional Market Coordination” panel session.

Benefits to Industry from the 2005 Work (provide specific examples):

The panel sessions on Transmission Operation, Market and System Operations, Market Models, and Inter-Regional Market Coordination were each keyed to specific issues of great current and ongoing interest in the industry.

Benefits to Volunteer Participants from the 2005 Work (provide specific examples):

The organizers of panel sessions have attracted considerable attention and interest for their work.

Recognition of Outstanding Performance:

Shmuel Oren, Alex Papalexopoulos, Luis Barroso, Marcelino Madrigal, Lawrence Jones, and S.-K. Joo have been outstanding contributors in organizing panel sessions. Shmuel Oren, Alex Papalexopoulos, and Lawrence Jones, in particular, have been consistently contributing as panel session organizers for a number of years.

Significant Plans for 2006:

Our main plans for 2006 are to continue providing outstanding panel sessions at the meetings. We also plan to involve FERC in the development of a dictionary of standard market terms.

Problems and Concerns:

A continuing concern is the lack of utility participation in the sub-committee. We have strong participation by vendors and academia.

2. Subcommittee on Risk, Reliability, and Probability Applications

Chair: James McCalley, Iowa State University

This document reports on the significant accomplishments in 2005 of the IEEE PES Subcommittee on Risk, Reliability, and Probability Applications Subcommittee, and provides plans for 2006.

There were three significant accomplishments of RRPA in 2005.

1. Revision to IEEE Standard 762: This standard, called “IEEE Standard Definitions for Use in Reporting Electric Generating Unit Reliability, Availability, and Productivity,” is heavily referenced in collecting and using generator unit reliability data. For example, a database maintained by NERC on Generator Availability Data System (GADS) was developed consistent with Standard 762. However, Standard 762 had not been revised since 1987, and terms and definitions contained in it did not reflect the many changes that have occurred in the industry since that time. Andy Ford of PJM chaired the working group. The focus of the revision was on performance measures to be used in a competitive marketplace. This effort was recognized with a PSACE Working Group Recognition Award at the 2005 IEEE PES General Meeting. Members included A.P. Ford, Chair, R.M. Fluegge, Secretary, M. P. Bhavaraju, C. Grigg, M. T. Schilling, H. Chao, J. Mitra, A. W. Schneider, Jr., J. W. Charlton, J. W. Kirby, G. A. Schuck, Ali A. Chowdhury, J. J. Lofe, C. R. Cordes, G. M. Curley, P.A. McPeck, P. Gelineau, and V. Micali.
2. Tutorial at 2005 IEEE PES General Meeting: A tutorial on “Electric Delivery System Reliability Evaluation,” organized by Joydeep Mitra, was given at the 2005 IEEE PES General Meeting. Instructors included Murty Bhavaraju, Roy Billinton, Richard Brown, John Endrenyi, Sakis Meliopoulos, Joydeep Mitra, Wenyuan Li, and Channan Singh. It was attended by 32 participants. An IEEE tutorial book was published as a result.
3. Panel Session at 2005 IEEE PES General Meeting: A panel session titled “Experiences of Reliability-centered maintenance for maintenance management of electric power systems” organized by Lina Bertling, was held at the 2005 IEEE PES General Meeting. Panelists included Lina Bertling, Pasi Yli-Salomäki, Iony Patriota de Siqueira, Fredrik Backlund, and Gerard Cliteur.

Plans for 2006 include:

- Organization of two panel sessions at the 2006 IEEE PES General Meeting:
 - a. “Generating Unit Performance in Deregulated Environment: New revised Standard, Application and Commercial Availability,” Organized by Andy Ford and Murty Bhavaraju.
 - b. “Towards a Balanced, Flexible and Diversified ENERGY Portfolio,” Organized by Puica Nitu.
- Organization of a panel session at the Dallas T&D meeting on “Prevention and mitigation of cascading scenarios and blackouts,” organized by Jim McCalley.

- Work on a task force called “Task Force on Resource Adequacy Indices for Planning Power Systems Operating under Competitive Electricity Market Conditions” chaired by Puica Nitu.

3. Subcommittee on Computing and Analytical Methods Subcommittee

Chair: Edwin Liu, Nexant

Highlights of Accomplishment

- CAMS website is up. The URL address <http://ewh.ieee.org/cmte/psace/cams.html>
We posted meeting minutes, membership list, and presentation materials.
- We proactively supported the PSC&E in October 2004. It was a very successful conference.
- We organized three panel sessions at the General Meeting 2005. There were all well-attended.
 - Advanced IT for EMS,
 - New Roles of State Estimation in the Competitive Markets, and
 - Improved Technologies for Solving State Estimation.
- As a subcommittee, we met at the General Meeting 2005. This is a combined CAMS and SEWG meeting. Both the Vice Chair of CAMS Dan Kirschen, and Chair of SEWG Tom Overbye, attended. In the meeting, we invited Mr. Andy Katz to give us a presentation on “Open Source Software Alternatives - How Can Developers Benefit?” In this presentation, Mr. Katz discussed OSS issues from an information technology point-of-view. He provided background and history on OSS development, the current OSS revolution, community vs. vendor based offerings, total ownership costs, OSS pros and cons, etc., and then presented a real-world case study of a live application developed using freely available OSS.
- A new Task Force on Wind Power Generation under the PSACE Committee will be formed. The coordinator is Prof. Mark O’Malley from University of Ireland. If you are interested in such topic, please contact him directly. CAMS will have Prof Chan-Nan Lu as a liaison in the Task Force.

Plans for 2006

- We currently plan to have four panel sessions for the General Meeting 2006.
 - Title: High Speed Computation to Power Problems; Chair: Steve Widergren
 - Title: LMPs in Practice; Chair: Daniel Kirschen
 - Title: Open Source Software Applications; Chair: Edwin Liu
 - Title: Power Grid Cyber-Security; Chair: Tom Overbye
- The PSC&E 2006 will be at Atlanta, Georgia, October 29 – November 1, 2006. The General Chair is John Paserbe, Technical Chair is Juan Sanchez-Gasca. CAMS will continue supporting the conference.

4. Subcommittee on Intelligent Systems Applications to Power Systems

Chair: Dagmar Niebur, Drexel University

This document reports on the significant accomplishments in 2005 of the IEEE PES Subcommittee on Intelligent Systems Applications to Power Systems, and provides plans for 2006.

The subcommittee has 3 active task forces on

3.1 Task Force on Multi-Agent Systems: Steve McArthur

Focus: Definitions for multi-agent technology, and, developing toolkits and standards. Tutorial on “Multi-agent systems and application to power systems” is planned for 2007-2008.

3.2 Task Force on Intelligent Data Mining and Analysis: Surya Santoso

Focus: Data mining and analysis approach for forecasting.

A formal tutorial paper for transaction publication will be prepared and members are invited to contribute. A panel for GM 2006 is currently organized, see list below and is planned to be repeated at PSCE 2006.

3.3 Task Force on Intelligent Control Systems (ICS): Ganesh Kumar Venayagamoorthy

Scope: Intelligent control of power systems including the application of computational intelligence techniques such as neural networks, fuzzy logic, evolutionary computing, swarm intelligence and adaptive critic designs for the control and optimization of all the elements that make up a power system ranging from the power plant through the transmission and distribution networks to the end user.

Task force had first meeting at GM 2005. A panel for GM 2006 is currently organized, see list below.

Panel Sessions at GM 2005:

The subcommittee organized four panel sessions at 2005 IEEE PES General Meeting:

- 1. Symbolic Computation for Power Systems (panel)**
Chair: D. Niebur, Drexel University

2. **Intelligent System Applications for Power Quality Data Analysis (panel)**
Chair: S. Santoso, The University of Texas at Austin
3. **Multi-Agent Systems (MAS) in Power Engineering (panel)**
Chair: S. McArthur, University of Strathclyde
4. **Artificial Intelligence Techniques for Dynamic Security Assessment (panel)**
*Chairs: N. Hatziargyriou, National Technological University of Athens
D. Niebur, Drexel University*

Conference Organization of ISAP'05

Several subcommittee members organized the 13th International Conference on Intelligent System Applications to Power Systems which took place in Arlington, VA 11/06/05-11/10/05. The conference was technically co-sponsored by IEEE-PES and its proceedings including 90 technical papers from 18 countries as well as 6 tutorial papers will be available through IEEE Explore Data Base. The technical chairs of the conference, K. Y. Lee and D. Niebur and the general chair, J. A. Momoh would like to express their gratitude to the subcommittee members for their help with the review process as well as for their participation and support of ISAP 2005. The subcommittee members will remain actively involved in the organization of ISAP 2007.

Plans for 2006 include:

Panels currently been organized for the IEEE PES GM06 in Montreal:

1. Utility Applications of Intelligent Systems organized by Lawrence E. Jones, AREVA T&D, WA, USA.
2. Concepts and Approaches in Multi-Agent Systems for Power Engineering Applications, Stephen McArthur, University of Strathclyde, UK.
3. Intelligent Data Mining and Analysis Applications to Solving Power System Problems, Surya Santoso, The University of Texas at Austin.
4. Intelligent Techniques for Power System Generation Control, Ganesh Kumar Venayagamoorthy, University of Missouri-Rolla and Kwang Y. Lee, The Pennsylvania State University at University Park, PA, USA

Panels to be organized and/or repeated for the IEEE PES PSCE 06 in Atlanta:

1. Intelligent Data Mining and Analysis Applications to Solving Power System Problems, Surya Santoso, The University of Texas at Austin, TX, USA.

2. Symbolic Computation for Power Systems, D. Niebur, Drexel University, PA, USA.
3. Intelligent Systems for Economic Operation of Power Systems, A. Bakirtzis, Aristotle University of Thessaloniki, Greece.

5. Subcommittee on Distribution System Analysis Subcommittee Report

Chair: Sandoval Carneiro, Federal University of Rio de Janeiro, Brazil

Vice Chair: Karen Miu, Drexel University

1. Significant accomplishments in 2005 (Please explain why these are significant and include details and examples)

Accomplishments for the 2005 year by the DSA Subcommittee include the coordination of 3 panels (2 presented at GM2005 and 1 to be presented at the re-scheduled T&D2005.) At GM2005, both panels were attended by between 30-40 conference registrants, the panels included:

- a. Advanced Models for Distribution Systems Analysis. Chair: Karen Miu.
- b. Advanced Applications in Distribution Reconfiguration. Co-Chairs: Noel Schulz and NDR Sarma.

The majority of panelists were from industry. For T&D2005, one panel was organized, entitled:

- a. DER Impact on Distribution Systems Analysis. Co-chairs: S. Widergren and N. Schulz

In addition, the Radial Test Feeder Task Force (Chair: W. Kersting) has lead the acquisition and coordination of short circuit data for the IEEE Distribution Test Cases. The dissemination of these values is planned to occur through the DSA Subcommittee website and will allow researchers and software developers to benchmark results in a uniform manner. This is critical for measuring the success and comparing different short circuit analysis methodologies.

2. Benefits to industry and PES members from 2005 work (provide specific examples and explain what the benefits are)

Lively discussions of distribution system analysis approaches were enabled to the benefit of industry and PES members through the organized panel sessions at GM2005. Frank, moderated discussions of techniques are vital because of the emerging growth/interest in the fast changing distribution networks.

The formal determination of short circuit currents and fault voltages for the IEEE Radial Distribution Test Feeder will greatly benefit industry and PES members. Benchmarking of different analysis tools is critical to work for acceptance of new technologies by industry.

3. Benefits to volunteer participants from their 2005 work (provide specific examples and what the benefits are)

Volunteer participants including e.g. technical reviewers, panelists and committee members gain professional development, educational and leadership experiences by their activities associated with PSACE DSA.

4. Significant plan for 2006

Major plans for 2006 include the continuation of coordinating activities at IEEE PES conferences and for the completion of new distribution test feeders which include induction motor loads. The plans are significant because activities at the PES meetings reach sizable numbers of both industry and academia. The new test feeders are envisioned to be used by numerous industry and researchers for benchmarking new distribution analysis tools.

A total of 3 panel sessions are planned for GM2006 and PSCE.

- a. GM2006 – 2 panels
 - i. Induction Motor Test Cases (R. Dugan Chair)
 - ii. Advanced Models for Distribution Systems Analysis (S. Carneiro Chair)
- b. PSCE – 1 panel is planned

5. Problems and concerns

- a. Concerns were raised on the short amount of time General Meeting paper reviewers have to render decisions