

## BIOGRAPHICAL DATA - 2011

**SINGH, CHANAN**

**Regents Professor & Irma Runyon Chair Professor  
Department of Electrical & Computer Engineering  
Texas A&M University  
College Station, TX, USA**

Citizenship: U.S.

### ADDRESSES:

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### PROFESSIONAL INTERESTS:

- Reliability and Security of Electric Power Systems
- System Reliability, Theory and Applications
- Production Costing
- Power Quality

### EDUCATION:

- Ph.D., Electrical Engineering, University of Saskatchewan, Canada.
- MS, Electrical Engineering, University of Saskatchewan, Canada.
- B.S. (Honors), Electrical Engineering, Punjab Engineering College, Chandigarh, India.

### EXPERIENCE:

#### *Educational*

- Regents Professor, Irma Runyon chair professor, 2007- present
- Regents Professor, J.W. Runyon Professor September 2005-2006
- Professor & Head, Electrical & Computer Engineering, May 1997- August 2005
- Professor & Director, Electric Power Institute, 1992-1997.
- Professor & Associate Head, Electrical Engineering, Texas A& M University, College Station, Texas, 1986-1992.
- Professor, Electrical Engineering, Texas A& M University, College Station, TX, September 1984 - 1986
- Associate Professor, Electrical Engineering, Texas A& M University, College Station, TX, September 1981 - September 1984
- Assistant Professor, Electrical Engineering, Texas A&M University, College Station, TX,

September 1978 - August 1981

***Government***

- Director, Power Systems Program at the National Science Foundation, 1995-1996. Managed the power systems program and designed and implemented a new initiative, "Innovative Power Education in a Changing Environment".

***Industrial***

- Vice President, Associated Power Analysts, Inc., 1980-Present
- Senior Research Officer, Research & Development Division, Ontario Ministry of Transportation and Communication, Canada, July 1973- September 1978

***Consultant***

- California ISO
- Central Electrical Agency, India
- Edmonton Power, Canada
- Electric Reliability Council of Texas
- Electric Power Research Institute
- Eletrobrass, Brazil
- ESKOM, South Africa
- General Electric Co.
- Houston Lighting & Power Co.
- Korea Electric Power Co.
- Korea Power Exchange
- Korea Power Systems Reliability Research Center
- Manitoba Hydro, Canada
- MCI Communications
- Mid Continent Area Power Pool
- MAPPCOR
- Ministry of Transportation & Communications, Ontario, Canada
- Power Comp Associates Ltd, Saskatoon, Canada
- Sandia National Labs
- Saskatchewan Power Corporation, Regina, Canada
- SOHIO, ARCO & EXXON
- Stone and Webster
- Taiwan Power Corporation
- Texas Utilities
- Urban Transportation Development Corporation, Ltd., Kingston, Ontario, Canada

**HONORS & AWARDS:**

***External Awards***

- Inaugural recipient of IEEE-PES Roy Billinton Power System Reliability Award, for "Contributions to the methodological developments, education and practice of power system reliability evaluation", 2010
- Guest Professor, Tsinghua University, Department of Electrical Engineering (State Key laboratory of the Control and Simulation of Power System and Generation Equipments), April, 2010
- PMAPS Merit Award 2008 - Life long achievement award by the Probabilistic Methods

- Applied to Power Systems International Society (PMAPS), “for developing probabilistic methods for power systems”.
- IEEE Power Engineering Society, “Electric Delivery System Reliability Tutorial Award”, 2007.
  - IEEE Power Engineering Society, “Outstanding Power Engineering Educator Award”, 1998 for “Innovative Leadership in Power Engineering Education”.
  - Doctor of Science (peer evaluated) “For research contributions”, by the University of Saskatchewan, Canada, May 1997
  - IEEE/PES Outstanding Working Group Award - 1997
  - IEEE/PES Technical Committee Prize Paper Award for “Pooling Generating Unit Data for Improved Estimates of Performance Indices,” 1997
  - Elected Fellow of IEEE for “Contributions to Theory and Applications of Quantitative Reliability Methods in Electric Power Systems”, 1991
  - Ross Medal of the Engineering Institute of Canada for the best Electrical Engineering paper for 1972, “The Frequency and Duration Method of Generating Capacity Reliability Evaluation”, Transactions of EIC, Vol. 15, No. C-1, March 1972.
  - Gold Medal of the Punjab University for being the overall top most student amongst all branches of engineering and in all affiliated colleges in the graduating class.
  - Gold Medal of the Punjab Engineering College, for the top-most student in Electrical Engineering.

#### ***Internal Awards***

- Distinguished Electrical Engineering Professor, Institute of Electrical and Electronics Engineers (IEEE) Student Chapter, 2004. This was a special award by the student chapter given for the first time.
- Appointed to J.W. Runyon, jr. '35 Professorship II
- Named Texas A&M System Regents Professor, Texas A&M System, December 2001.
- Awarded the Texas A&M Former Student's Association, University Level Distinguished Award in Research (Highest university award in research), TAMU, 1997.
- Dresser Professorship, for excellence in research and education 1992-1993.
- Halliburton Professorship for excellence in research and education, 1986--1987.
- Senior TEES Fellow, for excellence in research 1989-present.
- TEES Fellow, for excellence in research 1987-89.

#### **PROFESSIONAL LICENSES:**

- Registered Professional Engineer, State of Texas

#### **EDITORSHIP:**

- Editorial Advisory Board, Microelectronics & Reliability, Pergamon Press Editorial Board (1978-1996)
- Editorial Advisory Board, Electric Machines and Power Systems
- Editorial Advisory Board, International Journal of Emerging Electric Power Systems (IJEEPS)
- European Transactions on Electric Power (ETEP)
- Editor, IEEE Transactions on Power Systems
- Editor, IEEE Power letters

#### **PROFESSIONAL SOCIETY MEMBERSHIP**

- Fellow IEEE

## PROFESSIONAL COMMITTEE MEMBERSHIP/CHAIR

- Member IEEE Fellows Committee, Effective January 2010
- IEEE Press Editorial Board, 2004-2006.
- International Technical Advisory Committee, PMAPS, 2004,2005 - member
- International Advisory Committee, IEEE DRPT 2004, 2003 - Present
- Chair IEEE-PES Outstanding Power Engineering Educator Award Committee, 2003-2005
- International Advisory Committee, PowerCon 2002 - member
- Chair Life Long Learning Sub-Committee, IEEE-PES, 2000-2003
- Member Power Engineering Education Committee, 1999-Present
- PES Liaison to IEEE Press Board, 1999-2005
- Chair History Committee, IEEE-PES, 1998-Present
- Chair, Reliability Risk & Probability Applications Subcommittee, IEEE-PES, 1996-2001
- Chair, Application of Probability Methods Subcommittee, IEEE-PES, 1995-1996
- Chairman, Energy Technology Assessment Committee, 1988-1985, IEEE Reliability Society
- Member, APM-PES Task Force on Bulk Power System Reliability
- Member, APM-PES Task Force for Bibliography on Application of Probability
- Member, APM-PES Task Force on Protection System Reliability
- Member, APM-PES Task Force on Bulk Power Indices
- Member, APM-PES Task Force on Generator Data Pooling
- Member, APM-PES Task Force on Probability Methods Applied to Determine Criteria
- Member IEEE Energy Committee (Reliability Society Representative)
- Member IEEE History Committee
- Member, IEEE Press Board for Power Systems Engineering
- Member, IEEE-PES, Renewable Resources and Energy Storage Committee
- Member, IEEE-PES, Recognition Working Group of Power Systems Engineering Committee
- Member, Planning Committee of Power Distribution Conference
- Member Power System Reliability Subcommittee, IEEE-IAS

## SIGNIFICANT FUNDED PROJECTS

1. Co-Investigator (Co-PIs A.D. Patton, J. Foster), Large Scale System Effectiveness Analysis, US Department of Energy, \$300,000, 1978-99
2. Principal Investigator, Modeling of Unit Operating - Considerations in Generating Capacity Reliability Evaluation, EPRI RP153 4-1, Project No. RF 4220-1, 3, Jan. 1980 to May 1982, \$103,817.00
3. Principal Investigator, Reliability Evaluation of Electric Power Systems with Unconventional Energy Sources, Center for Energy & Mineral Resources (CEMR) Project 12970, \$23,500.00
4. Principal Investigator, Reliability Modeling of Interconnected Systems Recognizing Operating Considerations, EPRI RP 1534-2, Project RF 4908, starting June 1983, \$102,151.00.
5. Co-PI, Study of Effect of Load Management on Generating System Reliability, EPRI Project RP 1955-3, 1984, \$75,000.00.
6. Principal Investigator, Reliability Evaluation of Bulk Power Systems, Center for Energy & Mineral Resources, Nov. 1984 - Aug. 1985, \$8,000.00.
7. Principal Investigator (Co-PI A.D. Patton), Reliability Study of Space Station Electrical

- Power System, NASA - Johnson Space Center, Jan. 1985, \$46,167.00.
8. Principal Investigator, (Co-PIs, A.D. Patton, M. Ehsani, Bob Nevels), Conceptual Design of Power Management and Distribution System for Space Station, NASA - Johnson Space Center, Jan. 1985, \$54,386.00.
  9. Principal Investigator, Reliability Evaluation of Generation Systems Including the Effect of Energy Limitations, Center for Energy and Mineral Resources, 1986-1987, \$13,200.00.
  10. Principal Investigator (Co-PI A. D. Patton), Reliability Analysis of Space Electric Power System, NASA, JSC, Jan. 1987, \$57,367.00.
  11. Co- PI, Reliability Modeling and Evaluation in Power Systems, funded by U.S.-Yugoslav Joint Board on Scientific & Technological Cooperation.
  12. Co-Principal Investigator, (PI M. Styblinski) Optimal Engineering Design Methodologies for High Manufacturing Yield and Reliability, Institute for Innovation in Design and Engineering, TAMU, 1987, \$13,680.00.
  13. Principal Investigator, A Knowledge Based Approach to Power System Reliability Evaluation Including Station Originated Outages, Center for Energy and Mineral Resources, 1987-88, \$13,600.00.
  14. Principal Investigator, (Co-PI M. Styblinski) Reliability in the Design and Operation of Flexible Manufacturing Systems, Program for Automated Manufacturing, 1987-89, \$38,500.00.
  15. Principal Investigator, A Realistic and Viable Methodology for Reliability Analysis of Multi-Area Interconnected Power Systems, National Science Foundation, 1987-91, \$215,000.00.
  16. Co-PI, (PI: M. Styblinski), New Design Techniques For High Manufacturing Yield and Reliability, Texas Advanced Technology and Research Program, 1988-91, \$300,000.00.
  17. PI, Monte Carlo Approach to Estimate Statistics for Bulk Power System Reliability," EPRI & PSG&E, 1990-1991, \$51,425.00.
  18. PI, Developing a Realistic and Viable Methodology for Reliability Analysis of Multi-Area Interconnected Power Systems, National Science Foundation, 1991-1994, \$200,000.00.
  19. Co-PI (PI: P. Enjeti), Effect of High Frequency PWM Waveforms on the Operation of Adjustable Speed AC Motor Drives in Energy Sensing Applications, Energy Resources Program, 1994-1995, \$25,000.00.
  20. PI, Analytical Techniques for Probabilistic Production Costing, Geographically Differentiated Marginal Cost, and Reliability Indices in Interconnected Power Systems, National Science Foundation, 1994-1997, \$143,311.00.
  21. PI, Open Transmission Access: Challenges and Solutions, Energy Resources Program, 1995-1996, \$25,000.00.
  22. Co-PI and Advisor, (PI: P. Enjeti), Acquisition of Advanced Instrumentation and Test Equipment for Research, Education and Training in Electric Power Quality, National Science Foundation, 1994-1995,\$446,398.00.
  23. PI, IPA Assignment, National Science Foundation, 1995-1996, \$125,313.
  24. Co-PI, (PI- P. Enjeti) Development of An Active Filter to Cancel Neutral Current Harmonics, Texas Higher Education Board, 1996-1998, \$126,000.00.
  25. PI, Advanced Power Quality Research, Energy Resources Program, \$25,000, 1997-1998.
  26. Co-PI, (PI: M. Styblinski), Comprehensive IC Design for Quality Using a Statistical Behavioral Modeling Approach, Semiconductor Research Corporation, \$107,000.00, 1996-1998.
  27. Co-PI, (PI: M. Styblinski), Behavioral Statistical Modeling Approach to Top-Down IC Design for Quality and Manufacturability, Texas Higher Education, Coordinating Board, \$179,770.00, 1996-1998.
  28. PI, Electric Power Network Reliability Evaluation Using Self-Organizing Maps, Energy Resource Program, \$25,000, 1999-2000
  29. PI, Concepts and Algorithms for Power Network Reliability Evaluation Using Self-Organizing Maps and New Insights into the Structure of State Space, National Science Foundation, \$135,212, 1999-2002.
  30. Co-Pi, (PI- G. Huang) Power System Reliability Analysis including Dynamics, Texas Higher Education Coordinating Board, \$159,504, 2000-2002
  31. Co-PI (PI - P. Enjeti), Acquisition of Test Equipment, National Science Foundation,\$150,000, 2001-2005

32. Co-PI (with M. Kezunovic, J. McCalley & V. Honavar -Iowa State), Automated Integration of Condition Monitoring with an Optimized Maintenance Scheduler for Circuit Breakers and Power Transformers, \$225,000, PSERC, 2002-2005
33. PI, "Enhancing the Quality and Quantity of Electrical and Computer Engineering Graduates", Texas Higher Education Coordinating Board, \$850,192. , 2002 - 2007.
34. Co-PI (with George Gross of UIUC, Sakis Meliopoulos of Georgia tech and Richard Schuler of Cornell), Reliability Assessment Incorporating Operational Considerations and Economic Aspects for Large Interconnected Grids, \$ 180,000, PSERC, 2004- 2006.
35. PI, "Improving the Quality, Quantity, and Diversity of Electrical and Computer Engineering Graduates", Texas Higher Education Coordinating Board, \$313,828. , 2004 - 2006
36. PI," SGER: Exploring the future of Distributed Generation and Micro-Grid Networks", National Science Foundation, \$50,000, 2004-2005
37. PI (Co- PIs Drs. Sprintson and Guikema), Modeling of Catastrophic Failures in Power and Communication Systems: Supporting Design, Preparation and Recovery, National Science Foundation, \$299,842.00, 2007-2010
38. Co-PI with J. McCalley (Iowa State), Special Protection Schemes: Limitations, Risks, and Management, \$92,600, PSERC 2008-2010.
39. Collaborator (with Dipti Srinivasan and Panida Jirutitijaroen of National University of Singapore), Computational Tools for Optimal Planning and Scheduling of Distributed Renewable Energy Sources, \$515,557 (S\$ 787,410), 2008-2011.
40. Collaborator (with Panida Jirutitijaroen of National University of Singapore), Optimization Techniques and Computational Tools for Reliability Analysis of a Large Interconnected Network, \$113468 (S\$173,300), 2008-2011.
41. Co-PI (with Alex Sprintson TAMU, George Gross & A. Garcia-Dominquez, UIUC), Integration of Storage Devices into Power Systems with Renewable Energy Sources,PSERC,\$240,000, 2010-2012PI (Co-PI: Alex Sprintson),
42. PI (Co-PI: Alex Sprintson),Modeling and Analysis of Interdependent Cyber-physical systems, Contacyt-Tamu Mingrant, \$12000, 2011-2012
43. Co-PI (with V. Vittal-ASU,A. Bose-WSU,S. Grijalva-GTECH,G. Heydt-ASU,S. Oren-UC Berkeley,T. Overbye-UIUC,), The Future Grid to Enable Sustainable Energy Systems: An Initiative of the Power Systems Engineering Research Center, Dept of Energy, \$5,512,900, 2011-2013.

## TECHNICAL PUBLICATIONS:

### A.1 Books

1. System Reliability Modelling & Evaluation, Hutchinson Publishing Group, U.K., R. Billinton, 1977.
2. Engineering Reliability: New Techniques & Applications, John Wiley & Sons, New York, B.S. Dhillon, 1981. *NOTE: This book has been translated into Russian by Mir Publishers, Moscow.*
3. Wind Power Systems: Applications of Computational Intelligence, L. Wang, C.Singh, A. Kusiak,(Eds), Springer, Heidelberg, 2010.
4. Co-author, IEEE Standard 493-1980. ``Recommended Practice for he Design of Reliable Industrial and Commercial Power Systems".
5. Co-author, IEEE Tutorial Book on Power System Reliability 1990.

## ***A.2 Book Chapters:***

1. Emergency Power Supply, J. Mitra, Wiley Encyclopedia of Electrical and Electronics Engineering, Editor J. G. Webster, 1999.
2. Monte Carlo Simulation and Intelligent Search Methods, J. Mitra, IEEE Tutorial Book on Electric Delivery System Reliability Evaluation, IEEE, 2005. Publication Number 05TP175.
3. Reliability Assessment of Composite Power Systems Using Genetic Algorithms, Nader Samaan, in Computational Intelligence in Reliability Engineering: Evolutionary Techniques in Reliability Analysis and Optimization (Studies in Computational Intelligence) Editor: Gregory Levitin, Springer publications, to be published in 2006.
4. Reserve-constrained multiarea environmental/economic power dispatch using improved particle swarm optimization, Lingfeng Wang, in Swarm Intelligence: Focus on Ant and Particle Swarm Optimization, Felix, T. S. Chan and M. K. Tiwari (Editors), Vienna, Austria: ARS Publishing, December 2007, pp. 395-406.
5. Risk and cost tradeoff in power dispatch considering wind power penetration based on multi-objective memetic particle swarm optimization, Lingfeng Wang, in Multi-objective Memetic Algorithms, C. K. Goh, Y. S. Ong, K. C. Tan, (Editors), Springer Series in Studies in Computational Intelligence, Springer-Verlag, 2009 .
6. Capacity Benefit Margin Evaluation in Multi-Area Power Systems including Wind power Generation Using Particle Swarm Optimization, Maryam Ramezani, Hamid Falaghi, C. Singh, in Wind Power Systems: Applications of Computational Intelligence, L. Wang, C. Singh, A. Kusiak, (Eds), Springer, Heidelberg, In Press.
7. Optimal Conductor Size Selection in Distribution Systems with Wind Power Generation, Hamid Falaghi, C. Singh, in Wind Power Systems: Applications of Computational Intelligence, L. Wang, C. Singh, A. Kusiak, (Eds), Springer, Heidelberg, In Press.

## ***B. Journal Papers (Refereed):***

1. Generating Capacity Reliability Evaluation in Interconnected Systems Using a Frequency and Duration Approach - Part I - Mathematical Analysis, IEEE Trans., PAS-90, No. 4, R. Billinton, July/August 1971.
2. Generating Capacity Reliability Evaluation in Interconnected Systems Using a Frequency and Duration Approach - Part II - System Applications, IEEE Transactions, PAS-90, No. 4, R. Billinton, July/August 1971.
3. Generating Capacity Reliability Evaluation in Interconnected Systems Using a Frequency and Duration Approach - Part III - Correlated Load Models, IEEE Transactions, PAS-91, No.5, Billinton, September/October 1972.
4. The Frequency and Duration Method of Generating Capacity Reliability Evaluation, Transactions of the Engineering Institute of Canada, Vol. 15, No. C-1, R. Billinton, March 1972.
5. System Load Representation in Generating Capacity Reliability Studies - Part I - Model Formulation and Analysis, IEEE Transactions, PAS-91, No. 5, R. Billinton, September/October 1972.
6. System Load Representation in Generating Capacity Reliability Studies - Part II - Applications and Extensions, IEEE Transactions, PAS-91, No. 5, R. Billinton, September/October 1972.
7. Reliability Modeling in Systems with Non-exponential Down Time Distributions, IEEE Transactions, PAS-92, No. 2, R. Billinton, March/April 1973.
8. A Frequency and Duration Approach to Short Term Reliability Evaluation, IEEE

- Transactions, PAS-92, No.6, R. Billinton, November/December 1973.
9. A New Method to Determine the Failure Frequency of Complex Systems, IEEE Transactions on Reliability, R. Billinton, October 1974.
  10. Reliability Evaluation of Large Repairable Systems, Microelectronics and Reliability, 1974.
  11. Frequency and Duration Concepts in System Reliability Evaluation, IEEE Transactions on Reliability, R. Billinton, April 1975.
  12. Tie Set Approach to Determine the Failure Frequency of System Failure, Microelectronics and Reliability, Vol. 14, No. 3, June 1975.
  13. Reliability Modeling Algorithms for a Class of Large Repairable Systems, Microelectronics and Reliability, No. 2, Vol. 15, 1976.
  14. On the Behavior of Failure Frequency Bounds, IEEE Transactions on Reliability, April 1977.
  15. Method of Stages for Non Markov Models, IEEE Transactions on Reliability, R. Billinton, S.Y. Lee, June 1977.
  16. Calculating the Frequency of Boolean Expression Being 1, IEEE Transactions on Reliability, Dec. 1977.
  17. Reliability Analysis of an M/N System with Inspections, Microelectronics and Reliability, M. D. Kankam, 1977.
  18. On S-independence in a New Method to Determine the Failure Frequency of a Complex Systems, IEEE Transactions on Reliability, June 1978.
  19. Bibliography of Literature on Fault Trees, Microelectronics and Reliability, Vol. 17, No. 5, B. S. Dhillon, 1978.
  20. A Generalized Conditional Frequency Formula, Microelectronics and Reliability, Vol. 18, No. 4, 1978.
  21. On the Characteristics of Method of Stages, IEEE Transactions on Reliability, April 1979.
  22. Calculating the Time Specific Frequency of System Failure, IEEE Transactions on Reliability, June 1979.
  23. Power Systems Reliability Evaluation, Electrical Power & Energy Systems, Vol. 1, No. 3, A.D. Patton, A.K. Ayoub, Oct. 1979.
  24. A Matrix Approach to Calculate the Failure Frequency and Related Indices, Microelectronics and Reliability, Vol. 19, 1979.
  25. Effect of Probability Distributions in Steady State Frequency, IEEE Transactions on Reliability, Aug. 1980.
  26. Equivalent Rate Approach to Semi-Markov Processes, IEEE Transactions on Reliability, Aug. 1980.
  27. Concepts for Calculating the Frequency of System Failure, IEEE Transactions on Reliability, Oct. 1980.
  28. Models and Concepts for Power System Reliability Evaluation Including Protection System Failure, Electrical Power & Energy Systems, A.D. Patton, Oct. 1980.
  29. Protection System Reliability Modeling: Unreadiness Probability and Mean Duration of Undetected Faults, IEEE Transactions on Reliability, A. D. Patton, Oct. 1980.
  30. A Cut-set Method for Reliability Evaluation of Systems Having S-Dependent Components, IEEE Transactions on Reliability, Dec. 1980.
  31. Operating Considerations in Generation Reliability Modeling - An Analytical Approach, IEEE Transactions, PAS-100, A.D. Patton, M. Sahinoglu, May 1981.
  32. Markov Cut-set Approach for the Reliability Evaluation of Transmission and Distribution Systems, IEEE Transactions, PAS-100, June 1981.
  33. Rules for Calculating the Time Specific Frequency of System Failure, IEEE Transactions on Reliability, Oct. 1981.
  34. Reliability Modeling of TMR Computer Systems With Repair and Common Mode Failures, Microelectronics and Reliability, Vol. 21, 1981, pp. 259-262.
  35. Non-Markovian Models for Common Mode Failures in Transmission Systems, IEEE Transaction on Power Apparatus and Systems, Reza Ebrahimian, Vol. PAS 101, No. 6, pp. 1545-1550, June 1982.
  36. Probability Distribution Functions for Generating Reliability Indices - Analytical Approach, IEEE Transactions, PAS-102, No. 6, M. Sahinoglu, et al., June 1983.
  37. Forced Frequency-Balancing Technique for Discrete Capacity Systems, IEEE Transactions on Reliability, Vol. R-32, No. 4, Oct. 1983.



38. Comparison of Mean Time to First Failure and Mean Up Time, *Microelectronics and Reliability*, Vol. 23, No. 1, 1983, S. Asgarpoor.
39. Evaluation of Load Management Effects Using the OPCON Generation Reliability Model, *IEEE Trans. on Power Apparatus and Systems*, Vol. PAS-103, No. 11, pp. 3230-3238, Nov. 1984, A.D. Patton.
40. Fractional Duration Before First Failure - A Useful Index and an Analytical Tool, *Microelectronics and Reliability*, Vol. 24, No. 1, 1984.
41. Generation Expansion Planning Using the Simultaneous Assessment of Several Adequacy Indices, *Transactions of the Canadian Electrical Association*, Vol. 24, 1984/1985, Dan Ruiu, A. D. Patton.
42. Markov Method for Generating Capacity Reliability Evaluation Including Operating Considerations, *Electrical Power and Energy Systems*, Vol. 6, 1984, S. Asgarpoor, A. D. Patton.
43. Reliability Evaluation of Emergency and Standby Power Systems, *IEEE Transactions of Industry Application Society*, Vol. IA-21, No. 2, March/April 1985, A. D. Patton.
44. Reliability Modeling of Generation Systems Including Unconventional Energy Sources, *IEEE Trans. Power Apparatus and Systems*, Vol. PAS-104, No.5, May 1985, A. L. Gonzalez.
45. Reliability Evaluation of Flow Networks Using Delta-Star Transformation, *IEEE Trans. on Reliability*, R-35, No. 4, pp. 472-477, Oct. 1986, S. Asgarpoor
46. Availability Analysis of a Two Unit Repairable Parallel Redundant System with Common Mode Failures and Arbitrarily Distributed Repair Times, *Microelectronics & Reliability*, Vol. 26, No. 6, pp. 1183-1188, 1986, Canio Dichirico.
47. An Analytical Technique for the Reliability Modeling of Generation Systems, Including energy Limited Units, *IEEE Trans. Power Systems*, PWRS-2, No.1, pp123-128, Feb. 1987, Q. Chen.
48. Equivalent Load Method for Calculating Frequency and Duration Indices in Generating Capacity Reliability Evaluation, *IEEE Trans. Power Systems*, PWRS-1, No. 1, pp. 101-107, Feb. 1987, Q. Chen.
49. Modeling Common Mode Failures in Transmission Lines when Repair Times and Gamma Distributed, *L'Energia Elettrica*, No. 3, 1987, R. Beydoun, C. Dichirico
50. Parameter Determination for Parallel Device of Stages, *Microelectronics & Reliability*, Canio Dichirico, Vol. 27, Issue 4, 1987, Pages 629-630.
51. Bulk Power System Reliability Concepts and Applications, *IEEE Trans. Power Systems* Vol. 3, No. 1, Feb. 1988, pp. 109-117, Endrenyi et al.
52. Detection of Aging in the Reliability Analysis of Thermal Generators *IEEE Trans. Power Systems*, Vol. 3. No. 2, pp. 490-499, May 1988. M. T. Schilling et al.
53. An Efficient Technique for Reliability Analysis of Power Systems Including Time Dependent Sources, *IEEE Trans. Power Systems*, Vol. 3, No. 3, Aug. 1988, pp. 1090-1096, Y. Kim.
54. Operating Considerations in Reliability Modeling of Interconnected Systems - An Analytical Approach, *IEEE Trans. Power Systems*, Vol. 3, No. 3, PP 1119-1126, Aug. 1988.
55. Reliability Analysis of Transmission Lines With Common Mode Failures When Repair Times Are Arbitrarily Distributed, *IEEE Trans. Power Systems*, Vol. 3, No. 3, pp. 1012-1029, Aug 1988, C. Dichirico.
56. Bibliography on the Application of Probability Method in Power System Reliability Evaluation, *IEEE Trans. on Power Systems*, Vol. 3, No. 4, pp. 1555-1564, Nov. 1988, Allen & Others.
57. Reliability, Availability & Maintainability as Factors in Evaluation and Operation of Computer Graphic Systems, J. Duggal, *International Journal of Applied Engineering, Education*, Pergamon Press.
58. Generation System Reliability Evaluation Using a Cluster Based Load Model, *IEEE Trans. on Power Systems*, Feb. 1989, Q. Chen
59. Improved Algorithms for Multi-Area Reliability Evaluation Using Decomposition-Simulation Approach, *IEEE Trans. on Power Systems*, Vol. 4, No. 1, pp. 321-328, Feb. 1989. A. Lago-Gonzales.
60. Modeling of Generating Unit Planned outages in The Decomposition - Simulator Approach for Multi-Area Reliability Calculations, *IEEE Trans. on Power Systems*, Vol. 4, No. 3, August

- 1989, A. Lago-Gonzales.
61. An Efficient Method for Generating Capacity Reliability Evaluation Including the Effect of Planned Outages, IEEE Trans. on Power Systems, Nov. 1989 Q. Chen
  62. The Extended Decomposition - Simulation Approach for Multi-Area Reliability Calculations, publication of the IEEE Trans. On Power System, Vol. 5, No. 3, August 1990, Alex Lago-Gonzales
  63. Modeling of Energy Limited Units in the Reliability Evaluation of Multi-Area Electrical Power Systems, IEEE Trans. on Power Systems, Vol. 5, No. 4, Nov. 1990, pp. 1364-1373, Q. Chen
  64. An Analytical Technique for Bulk Power System Reliability Evaluation, Electric Power Systems Research, Vol. 20, pp. 63-71, 1990, S. Asgarpour.
  65. A Generalized Continuous Distribution Approach for Generating Capacity Reliability Evaluation and its Applications, IEEE Trans. on Power Systems, Vol. 6, No. 2, Feb. 1991, pp. 16-22, M. Alavi
  66. A Simulation Model for Reliability Evaluation of Space Station Power Systems, IEEE Trans. on IAS, March/April 1991, pp. 331-374, A. D. Patton
  67. A Concise Method for Calculating Expected Unserved Energy in Generating System Reliability Analysis, S. Fockens, IEEE Trans. on Power Systems, Vol. 6, No. 3, pp 1085-1091, August 1991.
  68. A New Algorithm for Multi-Area Reliability Evaluation Simultaneous Decomposition -- Simulation Approach, Z. Deng, Vol. 21, 1991, pp. 129-136, Electric Power Systems Research.
  69. A Generalized Cumulant Method for Generating Capacity Reliability Evaluation, M. Alavi, Electric Power Systems Research, Jan. 1992.
  70. A New Index for Generating Capacity Reliability Studies -- Expected Cost Penalty, S. Asgarpour, Electric Power Systems Research, Vol. 23, pp. 23-29, Jan. 1992.
  71. Reliability Analysis of Generating Systems Including Intermittent Sources, S. Fockens International Journal on Electric Power & Energy Systems, Vol. 14, No. 1, pp. 2-8, Feb. 1992.
  72. A New Approach to Reliability Evaluation of Interconnected Power Systems Including Planned Outages and Frequency Calculations, IEEE Trans. on Power Systems Vol. 17, No. 2, pp. 734-743, May, 1992, Z. Deng.
  73. A New Technique for Generating Capacity Reliability Evaluation, J. O. Kim, Electric Power Systems Research, 23 (1992), pp 181-187.
  74. A Frequency and Duration Approach for Generation Reliability Evaluation Using the Method of Stages, J. O. Kim, IEEE Transactions on Power Systems, Feb. 1993.
  75. Convergence Characteristics of Two Monte Carlo Models for Reliability Evaluation of Interconnected Power Systems, Electric Power Systems Research, (28), 1993.
  76. Bulk Power System Reliability Criteria and Indices, R. J. Ringlee et al., IEEE Trans. on Power System, Vol. 9, No. 1, pp. 181-190, Feb. 1994.
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  96. State Evaluation in Composite Power System Reliability Using Genetic Algorithms Guided by Fuzzy Constraints, Nader Samaan, Proceedings of PowerCon 2002, October 13-17, 2002 Kunming, China.
  97. Applications of Reliability Analysis to Power Electronics Systems, Prasad Enjeti, Joydeep Mitra, Proceedings of the IICPE 2002, December 15 -18, Bombay, India.
  98. Steady-state and Dynamic Security Assessment in Composite Power System, Hyungchul Kim, IEEE International Symposium on Circuits and Systems, vol. 3, pp. 25-28, May, 2003, Thailand.
  99. Security Analysis for system Operation Using Bayes Classifier, Hyungchul Kim, Proceedings of the Power Engineering Society General Meeting, July 2003, Canada.
  100. Integrated Power System Vulnerability Analysis Considering Protection Failures, Xingbin Yu, Proceedings of the Power Engineering Society General Meeting, Toronto, July 13-17, 2003.
  101. Voltage magnitude contingency ranking: bounded network approach, A. Ozdemir, Proceedings of Power Engineering Society General Meeting, July 2003
  102. Using Genetic Algorithms for Composite System Reliability Indices Considering Chronological Load Curves, Nader Samaan, Proc. of Intelligent Systems Application to Power Systems, ISAP 2003, August 2003, Greece.
  103. Genetic Algorithms Approach for the Evaluation of Composite Generation-Transmission Systems Reliability Worth, Nader Samaan, Proc. of IEEE/PES Transmission and Distribution Conference, September 2003, Dallas, USA.
  104. Total Transfer Capability Considering FACTS and Security Constraints, Xingbin Yu, Proceedings of Transmission & Distribution Conference and Symposium, Dallas, September 7-12, 2003.
  105. Oil-immersed Transformer Inspection and Maintenance: Probabilistic Model, Panida Jirutitjaroen, NAPS Symposium, 2003.
  106. The Application of Bayes Classifier in Power System Security Assessment, Hyungchul Kim, AIT ESI Conference, Thailand, January, 2004.
  107. Genetic Algorithms Approach for the Assessment of Composite Power System Reliability Considering Multi-State Components, Nader Samaan, International Conference on Probability Methods Applied to Power Systems, September 2004, Ames, Iowa, USA.
  108. Application of Importance Sampling in Power System Reliability Study, Xingbin Yu,

- Proceedings of DRPT, Hong Kong, April 5-8, 2004.
109. Expected Power Loss Calculation Including Protection Failures Using Importance Sampling and SOM, Xingbin Yu, Proceedings of Power Engineering Society General Meeting, Denver, June 6-10, 2004.
  110. Circuit Breaker and Transformer Inspection and Maintenance: Probabilistic Models, Satish Natti, Panida Jirutitijaroen, Mladen Kezunovic, Proceedings of PMAPS, Iowa, September 12-16, 2004.
  111. Genetic Algorithm Approach for the Assessment of Composite Power System Reliability Considering Multi-State Components, Nader Samaan, Proceedings of PMAPS, Iowa, September 12-16, 2004.
  112. Probabilistic Analysis of Total Transfer Capability Considering Security Constraints, Xingbin Yu, Proceedings of PMAPS, Iowa, September 12-16, 2004.
  113. Applications of Importance sampling in Power System Reliability Studies, Xingbin Yu Proceedings of NPSC 2004, Chennai, India.
  114. Sensitivity Analysis of Composite Power Systems Reliability Using Genetic Algorithms, Nader Samaan, Proceedings of NPSC 2004, Chennai, India.
  115. Unit commitment through a mixed-integer particle swarm optimization algorithm, L.F. Wang , Proceedings of IEEE Region 5 Technical, Professional, and Student Conference, San Antonio, April, 2006.
  116. Using Genetic Algorithms for Reliability Calculations of Complex Power Systems, Nader Samaan, Proceedings of ISCAS 2005, May 2005, Kobe, Japan.
  117. Multi-objective stochastic power dispatch through a modified particle swarm optimization algorithm, L. F. Wang, Special Session on Applications of Swarm Intelligence to Power Systems, Proceedings of IEEE Swarm Intelligence Symposium, Indianapolis, May, 2006.
  118. Particle swarm optimization based multiarea environmental/economic dispatch considering tie-line transfer limits, L. F. Wang, IEEE Power Transmission & Distribution Conference and Exposition, Dallas, TX, May, 2006.
  119. Stochastic combined heat and power dispatch based on multi-objective particle swarm optimization, L. F. Wang, Proceedings of the IEEE Power Engineering Society General Meeting, Montreal, Canada, June, 2006.
  120. A Global Decomposition Algorithm for Reliability Constrained Generation Planning and Placement, P. Jirutitijaroen ,Proceedings of the 9th International Conference Probabilistic Methods Applied to Power Systems, Stockholm, Sweden, June 2006.
  121. Power system adequacy and security calculations using Monte Carlo Simulation incorporating intelligent system methodology, Proceedings of the 9th International Conference Probabilistic Methods Applied to Power Systems, Stockholm, Sweden, June 2006.
  122. Sensitivity analysis on the probabilistic maintenance model of circuit breaker, Satish Natti, Mladen Kezunovic, Proceedings of the 9th International Conference Probabilistic Methods Applied to Power Systems, Stockholm, Sweden, June 2006.
  123. A Method for Generation Adequacy Planning in Multi-Area Power Systems Using Dynamic Programming and Global Decomposition, P. Jirutitijaroen , Proceedings of the Power Engineering Society General Meeting, Montreal, Quebec, Canada, June 2006.
  124. Reliability Analysis of Distribution Network with Distributed Generation, S. Duttagupta, Proceedings of the Power Engineering Society General Meeting, Montreal, Quebec, Canada, June 2006.
  125. PSO-based multi-criteria economic dispatch considering wind power penetration subject to dispatcher's attitude, L. F. Wang, Proceedings of IEEE North American Power Symposium (NAPS06), Carbondale, IL, September 2006.
  126. A Hybrid Method for Multi-Area Generation Expansion using Tabu-search and Dynamic Programming, Panida Jirutitijaroen, Proceedings of the 2006 International Conference on Power System Technology , Chongqing, China, October 2006.
  127. Multi-Area Generation Adequacy Planning Using Stochastic Programming, Panida Jirutitijaroen , Proceedings of the 2006 IEEE PES Power Systems Conference and Exposition, Atlanta, Georgia, October 2006.

128. Reliability-constrained optimum recloser placement in distributed generation using ant colony algorithm, L. F. Wang, Proceedings of IEEE Power System Conference and Exposition (PSCE06), Atlanta, GA, October 2006.
129. Tradeoff between risk and cost in economic dispatch including wind power penetration using particle swarm optimization, L. F. Wang, Proceedings of IEEE International Conference on Power System Technology (POWERCON06), Chongqing, China, October 2006.
130. PSO-based multidisciplinary design of a hybrid power generation system with statistical models of wind speed and solar insolation, IEEE International Conference on Power Electronics, Drives and Energy Systems for Industrial Growth (PEDES06), New Delhi, India, Dec 2006.
131. Reserve-constrained multiarea environmental/economic dispatch using enhanced particle swarm optimization, L. F. Wang, IEEE Proceedings of Systems and Information Engineering Design Symposium (SIEDS06), Charlottesville, VA, 2006, pp. 99--103.
132. PSO-based multi-criteria optimum design of a grid-connected hybrid power system with multiple renewable sources of energy, L. F. Wang, Proceedings of IEEE Swarm Intelligence Symposium (SIS07), Honolulu, HI, April 2007.
133. Compromise between cost and reliability in optimum design of an autonomous hybrid power system using mixed-integer PSO algorithm, L. F. Wang, IEEE Proceedings of International Conference on Clean Electrical Power (ICCEP07), Capri, Italy, May, 2007.
134. Stochastic Programming Approach for Unit Availability Consideration in Multi-Area Generation Expansion Planning, Panida Jirutitijaroen accepted to the 2007 Power Engineering Society General Meeting, Tampa, Florida, June 2007.
135. Reliability-constrained design of a hybrid generating systems including intermittent sources using integer-coded particle swarm optimization, L. F. Wang, IEEE Power Engineering Society General Meeting 2007, Tampa, FL, June 2007.
136. PSO-based hybrid generating system design incorporating reliability evaluation and generation/load forecasting, L. F. Wang, IEEE Proceedings of Power Tech 2007 (PowerTech 07), Lausanne, Switzerland, July 2007.
137. Adequacy assessment of power-generating systems including wind power integration based on ant colony system algorithm, L. F. Wang, IEEE Proceedings of Power Tech 2007 (PowerTech 07), Lausanne, Switzerland, July 2007.
138. Reliability evaluation of power-generating system including time-dependent source based on binary particle swarm optimization, L. F. Wang, Proceedings of IEEE International Congress on Evolutionary Computation (CEC07), Singapore, September, 2007.
139. Genetic algorithm based adequacy evaluation of hybrid power generation system including wind turbine generators, L. F. Wang, Proceedings of the 14th IEEE International Conference on Intelligent System Applications to Power Systems (ISAP07), Kaohsiung, Taiwan, November 2007.
140. An alternative to Monte Carlo simulation for system reliability evaluation: search based on artificial intelligence, L. F. Wang, Proceedings of the 3rd International Conference on Reliability and Safety Engineering (INCREASE07), Udaipur, India, December, 2007.
141. Role of artificial intelligence in the reliability evaluation of electric power systems, L. F. Wang, IEEE International Conference on Electrical and Electronics Engineering (ELECO07), (Invited paper), Bursa, Turkey, December 2007.
142. Comparative Study of System-Wide Reliability-Constrained Generation Expansion Problem, Panida Jirutitijaroen, accepted to the 2008 Third International Conference on Electric Utility Deregulation and Restructuring and Power Technologies (DRPT 2008), China, April 2008.
143. Adequacy Assessment of Power Systems through Hybridization of Monte Carlo Simulation and Artificial Immune Recognition System, Lingfeng Wang, Proceedings of the Power Systems Computation Conference, Glasgow, July 2008
144. Composite-System Generation Adequacy Planning Using Stochastic Programming with Sample-Average Approximation, Panida Jirutitijaroen, Proceedings of the Power Systems Computation Conference, Glasgow, July 2008

145. Multi-deme parallel genetic algorithm in reliability analysis of composite power systems, L. F. Wang, IEEE Power Tech 2009 (PowerTech 09), Bucharest, Romania, June 2009, accepted.
146. Reliability evaluation of composite power systems using parallel genetic algorithm: Some conceptual and simulation studies, L.F. Wang, Proceedings of IEEE Power System Conference and Exposition (PSCE09), Seattle, WA, March, 2009.
147. A conceptual study on reliability constrained power transmission system planning including wind power, L.F. Wang, IEEE Power & Energy Society General Meeting 2009, (Invited Panel Paper), Calgary, Alberta, Canada, July, 2009.
148. The concept of power unit zone in power system reliability evaluation including protection system failures, Kai Jiang, Proceedings of IEEE Power System Conference and Exposition (PSCE09), Seattle, WA, March, 2009.
149. Power System Reliability Modeling with Aging Using Thinning Algorithm, H. Kim, Proceedings of Power Tech 2009.
150. Evaluation of Hurricane Impact on Failure Rate of Transmission Lines Using Fuzzy Expert System, Yong Liu, ISAP 2009.
151. Composite Power System Reliability Modeling and Evaluation Considering Aging Components. H. Kim, ELECO 2009, Bursa, Turkey.
152. Modeling the Impact of Fire Spread on the Electrical Distribution Network of a Virtual City, Arijit Bagchi, Alex Sprintson, 41<sup>st</sup> NAPS, Oct 2009, Starkville, Mississippi.
153. Professional Resources to Implement the "Smart Grid", G. Heydt et al, 41<sup>st</sup> NAPS, Oct 2009, Starkville, Mississippi.
154. Evaluation of Failure Rates of Transmission Lines During Hurricanes Using Neuro-Fuzzy System, Yong Liu, PMAPS 2010, Singapore, June 2010.
155. Evaluation of Loss of Load Probability for Power Systems Using Intelligent Search Based Pruning, Robert Green, Zhu Wang, Lingfeng Wang, Mansoor Alam, PMAPS 2010, Singapore, June 2010.
156. State Space Pruning for Power System Reliability Evaluation using Genetic Algorithms, Robert Green, Zhu Wang, Lingfeng Wang, Mansoor Alam, 2010 IEEE PES General Meeting, July 2010, Minneapolis, Minnesota.
157. Reliability Assurance of Cyber-Physical Power Systems, (panel paper), 2010 IEEE PES General Meeting, July 2010, Minneapolis, Minnesota.
158. "Intelligent State Space pruning Using Multi-objective PSO for Reliability Analysis of Composite Power Systems: Observations, Analyses and Impacts", Robert Green, Lingfeng Wang, Mansoor Alam, IEEE PES General Meeting, Detroit, July 2011.
159. "Intelligent and Parallel State Space Pruning for Power System Reliability Analysis using MPI on Multicore Computers", Robert Green, Lingfeng Wang, Mansoor Alam, 2011 IEEE PES Innovative Smart Grid Technologies Conference, Anaheim, Jan 2011.
160. "State Space Pruning for reliability Evaluation Using Binary Particle Swarm Optimization", Robert Green, Lingfeng Wang, Mansoor Alam, IEEE PSCE, Phoenix, March, 2011.
161. "Power system reliability assessment using intelligent state space pruning techniques: A comparative study", Robert Green, Zhu Wang, Lingfeng Wang, Mansoor Alam, PowerCon 2010, Oct 2010, Hangzhou, China
162. "Optimal Scheduling and Operation of Load Aggregator with Electric Energy Storage in Power Markets", Yixing Xu, Le Xie, Proceedings of NAPS 2010, Oct 2010.
163. Reliability Evaluation of a Conceptual All-digital Special Protection System Architecture for the Future Smart Grid", Kai Jiang, 2011 IEEE PES General Meeting, July 2010, Detroit, Michigan.
164. Distribution Systems Reliability and Economic Improvement with Different Electric Energy Storage Control Strategies, Yixing Xu, 2011 IEEE PES General Meeting, July 2010, Detroit,

#### ***D. Agency Published Retrievable Reports***

1. Reliability Data and Analysis for Transit Vehicles, RR 217, R&D Division, Ministry of Transportation & Communications, Jan. 1977.
2. Reliability Analysis of Track Bound Transit Systems, RR 231, R&D Division, Ministry of Transportation & Communication, May 1977.
3. Large-scale System Effectiveness Analysis, Contract EC-77-S-01-5104, U.S. Department of Energy, A.D. Patton, et al., Nov. 1979.
4. Modeling of Unit Operating Considerations in Generating Capacity Reliability Evaluation, Vol. 1: Mathematical Models, Computing Methods, and Results, Electric Power Research Institute Report EPRI EL-2519, Vol. 1, Project 1534-1, A.D. Patton, et al, July 1982.
5. Modeling of Unit Operating Considerations in Generating Capacity Reliability Evaluation, Vol. 2: Computer Program Documentation, EPRI EL-2519, Vol. 2, A.D. Patton, et al., and July 1982.
6. Study of Effect of Load Management on Generating-System Reliability, EPRI EA3575, A.D. Patton, July 1984.
7. Reliability Modeling of Interconnected Systems Recognizing Operating Considerations, EPRI Report EL-4603, Vol. 1, Project RP 1534-2, Dec. 1985, A. D. Patton et al.
8. Reliability Modeling of Interconnected System Recognizing Operating Considerations, Vol. 2: Computer Program Documentation, EPRI Report EL-4603, Vol. 2, Project RP1534-2, Dec. 1985.
9. Reliability Study For Space Station Power System, NASA Final Report Project NAS 9-17321, A. D. Patton.
10. Monte Carlo Approach for Estimating Contingency Statistics, Vol. 1: Models and Methods, EPRI TR-103639-VI, Project 3159-01, July 1994.
11. Monte Carlo Approach for Estimating Contingency Statistics, Vol. 12, User's Manual for Macs, EPRI TR-103639-V2, Project 3159-01, July 1994.
12. The Impact of Restructuring Policy Changes on Power Grid Reliability, Final Report, SAND98-2178, 1998, A.D. Patton, David G. Robinson.

#### **COMMERCIAL SOFTWARE DEVELOPMENT**

1. Developer of GRIP. This program has been used by major power utilities in USA and Canada.
2. Developer of NARP. This program has been used by ERCOT and others. It is a multi-area Monte Carlo simulation program for reliability studies.
3. Developer of EPRI sponsored software OPCON that explicitly recognizes unit duty cycle and operating considerations in generating capacity reliability studies.
4. Developer of EPRI sponsored software OPRINS which explicitly recognizes operating considerations in multi-area reliability studies.

#### **GRADUATE STUDENTS**

##### *A. Current Graduate Students:*

Ph.D.	4
MS	2

##### *B. Past Graduate Students:*

Ph.D.	21
Masters	20

## PROFESSIONAL SERVICE

### *A. Reviewer for:*

1. Book Publishers
2. IEEE Transactions on Power Apparatus & Systems
3. IEEE Transactions on Reliability
4. IEE Proceedings
5. Inter-Ram Conference
6. International Journal of Electrical Power & Energy Systems
7. National Research Council of Canada
8. National Science Foundation
9. Power Industry Computer Applications Conference
10. Power Systems Computation Conference
11. Zeitschrift fur Operations Research

### *B. Session and Panel Chairman/Organizer*

- Power System Reliability Modeling, 1980, Modeling and Simulation Conference, Pittsburgh.
- Power System Reliability Evaluation, 1982, IEEE/PES Winter Power Meeting.
- RAM Analysis Applied to System Planning, 12th InterRAM Conference, 1985.
- Software and Modeling for RAM, Thirteenth Inter-RAM Conference, 1986.
- Protection Systems and the Reliability of Power Systems, Panel Session, 1988 Winter Power Meeting, New York.
- Space Reliability, 1990 ISRM, Tokyo, JAPAN.
- Invited to Chair, "Reliability, Sensitivity and Uncertainty," 12th PSCC Conference, Dresden, 1991.
- System Reliability Computations, 1992 Summer Power Meeting, Seattle, 1992.
- Session Chair at 1993 Athens Power Tech, Athens, Greece, 1993.
- Session Chair at ICPST'94, Beijing, China, 1994.
- Invited to participate in panel on Power Education in the Changing Industry Environment, American Power Conference, 1996.
- Invited to participate in panel "Future Needs for Intelligent Systems in the Changing Utility Environment," ISAP Conference, 1996.
- Session Chair, System Reliability Assessment, Power Engineering Society Summer Meeting, Vancouver, Canada, July 2001.

### *C. Invited Lectures and Short Courses*

1. Invited to talk to the Society of Reliability Engineers, Toronto Chapter, 1978.
2. "Power System Reliability Evaluation", American Society for Quality Control, 36th Annual Quality Congress, Detroit, May 1982.
3. "Advanced Power System Reliability", a 5-day short course, July 18 - July 22, 1983, given at Pontificia Universidad Catholica, Rio de Janeiro, Brazil, at the invitation of ELETROBRAS. The course was attended by University professors, graduate students and power system engineers from all across Brazil.
4. Invited to deliver a special lecture, "Power System Reliability: A Status Report" at The National Systems Conference Sept. 1983, at Vikram Sarabhai Space Center, Trivandrum India.
5. "Power System Reliability", a 2-day short course, 1985, at Saskatchewan Power Corporation, Regina, Canada.
6. "Power System Reliability Evaluation," a 5-day short course, 1986, at ESPOL, Guayaquil, Ecuador.

7. "Power System Reliability", an eight day short course, 1987, at University of Bari, Italy.
8. "Analytical Models for Generation Reliability", Lecture, 1987, Yugoslavia.
9. "Generation System Reliability", 2-day seminar, 1988, at MAPP, Minneapolis.
10. Invited lecturer at University of Nebraska, Lincoln, Nebraska.
11. "Reliability in Design," Seoul, Korea, 1989.
12. "Bulk Power Reliability," Tutorial at 1990 Winter Power Meeting.
13. "Bulk Power Reliability," Tutorial at 1990 Summer Power Meeting.
14. "Multi-Node Reliability Evaluations," July 1991, NSF Workshop on Uncertainty in Power Systems, University of Oklahoma.
15. "Multi-Area Reliability Using NARP," Tutorial for ERCOT, Feb. 1992.
16. "Generation System Reliability," A two-day short course to Manitoba Hydro, Winnipeg, Canada, June 1992.
17. "Power System Reliability," Short course to engineers from Korea Electric Power Company.
18. "Power System Reliability," one day short course sponsored by the IEEE Delhi, India Section, Jan. 9, 1993.
19. "Distribution System Reliability," A half day short course to Central Power Research Institute, Bangalore, India, Jan. 1993.
20. "Reliability of Interconnected Power Systems," A half day short course to the Indian Institute of Science, Bangalore, India, Jan 1993.
21. "Power System Reliability," A half day short course to Taiwan Power Corporation, Taiwan, March 1993.
22. "Power System Reliability Issues," ABB, TTI, Raleigh, NC, May 1993.
23. "Methods for Detection of Equipment Aging and Incorporation it in the Reliability Analysis," S. Asgarpoor, NSF Symposium on Power Systems Infrastructure, Pullman, Washington, Oct. 27-29, 1994.
24. "Power System Reliability," A five day short course to Eskom, Johannesburg, South Africa, 1995.
25. "Substations Reliability," Short course to engineers of Korea Electric Power Company, 1995.
26. Invited to participate in Vice-President (Al Gore) Symposium on the Power Systems for Next Generation of Vehicle, held in the White House Conference Center, Washington, DC, 1996.
27. Invited to participate in the workshop, "AI Techniques Applied to Electrical Distribution Systems," Indian Institute of Tech, Kanpur, India, December 1996.
28. Invited lecture, "Some Non-traditional Approaches to Accelerating the Monte Carlo Simulation for the Reliability Evaluation of Electric Power Systems", Curtin University of Technology, Perth, Western Australia, December, 2000.
29. Invited lecture, "Impact of Deregulation on Power System Reliability", Frontiers of Power Conference, Oklahoma State University, October, 2001
30. Invited lecture, "Impact of Restructuring on Power System Reliability", Grainger Distinguished Lecture, University of Washington, Seattle, May 3, 2002.
31. Invited tutorial, "Power Quality and Reliability", IICPE 2004, Bombay, India
32. Invited keynote, Exploring Intelligent System Methodologies in Power System Reliability Analysis", National Power Systems Conference, 2004, Chennai, India.
35. Invited lecture, "Current Research Topics", Korea Power Systems Reliability Research Center's Retreat, 2005, Jeju Island, Korea
36. Invited lecture, "Restructuring Of Power Industry: Present & Future Issues And Implications For Reliability", Korea Power Systems Reliability Research Center's Retreat, 2005, Jeju Island, Korea
42. Invited lecture, "Restructuring Of Power Industry: Present & Future Issues And Implications For Reliability", KPX (Korea Power Exchange), 2005, Seoul, Korea
43. "Short Tutorial on Power Systems Reliability", Hanyang University & Korea University, 2005, Seoul, Korea.
44. Invited 4 day short course, "Power System Reliability Analysis", Indian Institute of Technology, Kharagpur, India, January 2006.
45. Invited half day tutorial at IEEE Power Transmission & Distribution Conference and



- Exposition, Dallas, TX, May, 2006.
46. Invited half day tutorial at IIT Delhi, Power System Reliability Evaluation Using Monte Carlo Methods, IIT Delhi, Dec 2006
  47. Invited plenary talk, Multidisciplinary Planning and Operation of Power Systems including Renewable Energy Sources, NPSC-2006, IIT Roorkee, India.
  48. Invited talk, More Graduates and higher Quality through Curriculum Redesign, TETC Best Practices Conference, March 2007, Austin.
  49. A 3-day short course on Power System reliability, California ISO , September, 2007
  50. Invited lecture, Arizona State University, Role Of Artificial Intelligence In The Reliability Evaluation of Electric Power Systems, Oct 25, 2008.
  51. Keynote address at the International Conference on Reliability and Safety (INCREASE 2007), December, Udaipur, India.
  52. A 3-day short course on Power System Reliability to MAPCOR, Minneapolis, March 17-19, 2008.
  53. Key Note speech at The 2008 Academic Conference on Power System Operational Reliability, May 18-21, 2008, Beijing, China.
  54. Invited lecture, "Operational Reliability: Issues, Challenges and Possibilities", Tsinghua University, May 21, 2008, China.
  55. Invited 8 day short course on Power System Reliability at Tsinghua University, Beijing, May 11 to May 21, 2009
  56. Invited lecture, Reliability Issues in Power System Planning and Operations including Renewable Resources, IEEE Chapter Singapore, September, 2009
  57. Invited keynote lecture, Reliability Issues In Power System Operations and Planning with Renewable Energy Sources, 2009 ELECO, Nov 2009, Bursa, Turkey
  58. Invited key note, Reliability Issues in Operations and Planning with renewable Energy Sources, ISSE-2009, December, Tokyo
  59. Invited lecture at Meiji University in Japan, Impact of Wind farm Diversification on Reliability, Dec, Meiji University, 2009 December, Japan
  60. Invited lecture, An Alternative to Monte Carlo Simulation, A search Based on Intelligent Search, Waseda University, Japan, 2009
  61. Invited Tutorial, with Joydeep Mitra, Reliability of Sustainable Energy Systems, 2009 ICPS, Dec 2009, Kharagpur, India ( I could not attend but provided my power point and Joydeep made the presentation)
  62. Invited lecture, Reliability Issues in Power System Operations and Planning with Renewable Energy Sources, Tsinghua University, Sept, 2010.
  63. Invited keynote speech, Reliability Assurance of Emerging Cyber Physical Power Systems, APEEC 2011, Wuhan, China, March, 2011.

#### ***D. Other Significant Activities***

- Architect of the NSF 96-103 "Innovative Power Engineering Education in a Changing Environment". This is a special initiative that I created and was jointly sponsored by NSF & EPRI. Its objectives were to build partnerships between the industry and universities in the area of power engineering education, to identify the profile of power system engineers for the 21st century and develop enablers and methods for achieving this profile. The overall objective was to facilitate the transition of power engineering education into the next century.
- Invited to be external examiner of Ph.D. candidates at the University of Toronto, Canada, the University of Roorkee, India, Indian Institute of Technology Bombay, Thapar Institute of Engineering and Technology and Asian Institute of Technology, Thailand, Indian Institute of technology Kharagpur.
- Appointed Co-Promoter (Co-Advisor) of S. Fockens, a doctoral student of the University of Utrecht, The Netherlands. I guided the research of this student but he got his PhD from his university.

- Under United Nations Development Program, spent 4 weeks (Dec. 1992-Jan. 1993) with Indian Institute of Technology, Delhi; Indian Institute of Science, Bangalore India; Northern Regional Electrical Board, India; and Center Power Research Institute, Bangalore India, giving advice on power system reliability.
- Review of the Doctoral Program, University of Akron, April 2009.

## UNIVERSITY SERVICE

- Chairman, Graduate Studies Committee, Electrical Engineering Department, 1985-1992.
- Chairman, Irma Runyon Chair Committee, Electrical Engineering Department
- Member Graduate Instruction Committee, College of Engineering, 1985-1992.
- Chairman, Tenure & Promotion Committee, Electrical Engineering Department -- Two times
- Associate Head, Electrical Engineering Department, 1986-1992.
- Member, College Level Tenure and Promotion Committee.
- Member, Manufacturing Chair Committee, Department of Industrial Engineering 1988-1989.
- Member, EE Dept. Head Search Committee, 1990-1992.
- Awards Committee, College of Engineering, 1990.
- Chairman, Awards Committee, Electrical Engineering Department, 1990.
- Member, Microelectronics Chair Committee, Electrical Engineering Department, 1987-1990.
- Member, Tenure and Promotion Committee, Electrical Engineering Department, 1984-1989, 1992-1994.
- Member, Council of Principal Investigators, 1992-1993.
- Member, Tenure and Promotion Committee, Industrial Engineering Dept., 1994.
- Member, Distinguished Speakers Committee, 1996-97.
- Member, Association of Former Students Awards Committee
- Chair, Industrial Engineering Head Search Committee, 2000-2001, 2002-2003.
- Co-Chair, Computer Engineering Coordination Committee, 2003-2005
- Chair ECE Tenure and Promotion Committee, 2006,2007
- Member, College of Engineering Tenure and Promotion Committee,2006,2007
- Member, ECE Awards Committee,2006