Kyeon Hur, Ph.D.

Contact Information

Assistant Professor
School of Electrical and Electronic Engineering
Yonsei University
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Research Interests

Power electronics-based transmission controllers (HVDC & FACTS), Integration of renewable energy and controllable load, Measurement-based stability analysis and load modeling, Power quality, Superconducting fault current management, etc.

Professional Experience

Yonsei University, Seoul, Korea

Assistant Professor **Mar '10 to Present**

- Director of Smart Grid Research Lab.
- Associate Director of Super Grid Research Center - Advanced Energy Workforce Education Program Funded by Ministry of Knowledge Economy, Korea
- Supervisor of 16 graduate and 2 undergraduate students (as of Aug. 2012)
- Advisory Professor of Hyosung Power Performance Unit: HULab.
- Courses taught:
  Undergraduate courses: Digital Logic Design, Basic Circuit Theory, Power Systems Engineering, Power Electronics, Freshmen Seminar, Basic Engineering Design
  Graduate courses: Power Quality, Wind Energy System, Power System Operation and Electricity Market, Power System Dynamics and Stability

Electric Power Research Institute (EPRI), Palo Alto, CA, USA

Senior Project Scientist, Power Distribution & Utilization **Jul '08 to Jan '10**

- Managed and led collaborative research projects: Phasor Measurement Unit (PMU)-based out-of-step protection scheme, controlled-separation, operator training simulator for FACTS, dynamic conductor thermal ratings, interregional reactive power management and control, measurement-based load modeling, etc.
- Developed R&D portfolios and roadmap for the next generation monitoring, analysis and control towards smart transmission grid
- Organized and supported EPRI PDU Advisory Council and FACTS/HVDC Conferences

Electric Reliability Council of Texas (ERCOT), Taylor, TX, USA

Operations Engineer II, Advanced Network Applications, Operations Support **Mar '07 to Jul '08**

- Provided technical support to system operations engineers and operators, and EMMS applications engineers in power system stability assessment and network applications, including state estimator, real-time contingency analysis, online voltage and transient stability assessment
- Performed engineering studies for available transfer capability assessment, designing special protection schemes, voltage and transient stability assessment (member of Dynamics Working Group)
- Played an SME role in using AREVA EMS applications such as RTNET, VSA, TSA, Dynamic Ratings Applications, and ABB MMS applications including SCED, HRUC for New Texas Nodal Market

Samsung Electronics, Suwon City, Gyeonggi-do, Korea

R&D Engineer, Institute of Intelligent Systems, Mechatronics Center **Feb '98 to May '03**

- Designed sensorless field oriented control algorithm for high-performance AC drives (5.5kW–110kW, 2/400V): Pilot research
- Developed control algorithms and user interface for general-purpose AC drives (0.4kW–3.7kW, 2/400V): MOSCON E7 Series
- Developed real-time monitoring and programming software tool for Servo and AC drives
- Commissioned and integrated AC drives with PLCs for automated assembly lines of Home Appliances Division of Samsung Electronics

Education

The University of Texas at Austin, Austin, TX, USA

Ph.D., Electrical and Computer Engineering, May '07

- Dissertation: *Methodology for characterizing electric power system response and locating the energized capacitor banks using conventional power quality data*
- Supervisor: Prof. Surya Santoso
- Research Interests: Application of novel DSP algorithms to a variety of power quality problems and monitoring, electromagnetic transient modeling and simulation for power system analysis, wind energy system modeling and control, FACTS controllers, optimization applications to power system engineering
- Graduate Research Assistant: Research Projects with EPRI
- Teaching Assistant: Senior Design Lab., Power Electronics

Yonsei University, Seoul, Korea

M.S., Electrical Engineering, Feb '98

- Thesis: *Determination of the Profit-Maximizing Configuration for the Modular Cell Manufacturing System using Stochastic Process*
- Supervisor: Prof. Kwang B. Woo
- Areas of Concentration: Optimal manufacturing system operation and management, real-time computing (fault-tolerance techniques, performance measures, and system modeling), intelligent control

Yonsei University, Seoul, Korea

B.S., Electrical Engineering, Feb '96

Professional Memberships

Institute of Electrical and Electronics Engineers (IEEE), Senior Member, 2004–present

- Power and Energy Society: active in IEEE WG on Dynamic Performance and Modeling of HVDC Systems and Power Electronics for Transmission Systems
- Power Electronics Society
- Industry Applications Society

The Korea Institute of Electrical Engineers (KIEE), Member, 2010–present

- Power System Society: active in WGs on HVDC and Power System Equipment

The Korea Institute of Power Electronics (KIPE), Member, 2010–present

Professional Service

Associate Editor

- *Journal of Power Electronics (JPE)* – SCI/E indexed

Reviewer Service

- *IEEE Transactions on Power Delivery*
- *IEEE Transactions on Energy Conversion*
- *IEEE Transactions on Smart Grid*
- *IEEE Transactions on Power Electronics*
- *IEEE PES Letters*
- *IEEE Transactions on Applied Superconductivity*
- *Electric Power Systems Research–Elsevier*
- *Journal of Power Electronics*
- *Journal of Electrical Engineering and Technology*
- *Energies*
- *IEEE PES GM 2011, 2012, 2013*
- *2012 IEEE PES GM Student Poster: Judge*
- *2011 IFAC World Congress*
- *54^{th} IEEE MWSCAS, 2011*

Conference Service

- *2013 ICEIC, Bali, Indonesia, Feb. 1∼3, 2013: Technical Program Committee, Session Chair*
- *2012 ICEIC, Jeongsun, Korea, Feb. 1∼3, 2012: Technical Program Committee*
- *54^{th} IEEE MWSCAS, Seoul, Korea, Aug. 7∼10, 2011: Power Systems Track Chair*
- *11^{th} FACTS users meeting, Long Island, NY, Oct. 22∼24, 2008: Organizing Committee*
- *Annual KIEE Spring and Summer Conferences since 2010: Publication Chair*

Awards

- EPRI Performance Recognition Award for Inventing PMU-based OOS Scheme, December 2009
- EPRI Excel Award for Outstanding Accomplishment, December 2008
- ERCOT Thanks Award for the special achievement as an Exceptional Team Player, April 2008
- ERCOT Exceptional Performer Award, December 2007
- Student Housing Grants, IEEE PES General Meeting 2004, 2005
- Graduate Study Abroad Scholarship, Korea Science and Engineering Foundation, Fall 2003 ∼ Spring 2005
- Samsung Scholarship, Samsung Electronics Co., Ltd., Spring 1996 ∼ Fall 1997

Selected Journal Publications

[1] J. Yoo, and K. Hur, "Load Forecast Model Switching Scheme for Improved Robustness to Changes in Building Energy Consumption Patterns," *Energies*, 2013 (in press).

[2] T. Nam, J. Shim, and K. Hur, "Design and Operation of Double SMES Coils for Variable Power System Through VSC-HVDC Connections," *IEEE Transactions on Applied Superconductivity*, vol. 23, no. 3, p. 5701004, 2013.

[3] H. Kim, J. Shim, K. Sim and K. Hur, "Assessment of Improved Power Quality Due to Fault Current Limiting HTS Cable," *IEEE Transactions on Applied Superconductivity*, vol. 23, no. 3, p. 5602104, 2013.

[4] J. Shim, Y. Cho, S. Kim, S. Min and K. Hur, "Synergistic Control of SMES and Battery Energy Storage for Enabling Dispatchability of Renewable Energy Sources," *IEEE Transactions on Applied Superconductivity*, vol. 23, no. 3, p. 5701205, 2013.

[5] J. Shim, T. Nam, S. Kim, and K. Hur, "On the Reclose Operation of Superconducting Fault Current Controller for Smart Power Grid With Increasing DG,"

IEEE Transactions on Applied Superconductivity, vol. 23, no. 3, p. 5603004, 2013.

[6] J. Jang, and K. Hur, "A Novel and Smart Design of Superconducting Fault Current Controller: Implementation and Verification for various Fault Condition," *IEEE Transactions on Applied Superconductivity*, vol. 23, no. 3, p. 5602904, 2013.

[7] S.. Kihwele, K. Hur, and A. Kyaruzi "Visions, Scenarios and Action Plans Towards Next Generation Tanzania Power System," *Energies*, vol. 5, no. 10, pp. 3908–3927, 2012.

[8] D. Min, J. Heo, K. Hur, and S. Santoso, "Setting Parameters of the Analytic Wavelet Transforms for Estimating Electric Power System Damping Parameters," *IEEE Transactions on Power Delivery*, vol. 27, no. 4, pp. 2409–2411, 2012.

[9] D. Min, J. Heo, and K. Hur, "Signal Processing Techniques for Estimating Power System Modal Parameters," *Journal of Circuits, Systems, and Computers*, vol. 21, no. 6, pp. 1240019-1–1240019-13, 2012.

[10] G. Son, H. Lee, T. Nam, Y. Chung, U. Lee, S. Baek, K. Hur, and J. Park, "Design and control of a modular multilevel HVDC converter with redundant power modules for non-interruptible energy transfer," *IEEE Transactions on Power Delivery*, vol. 27, no. 3, pp. 1611–1619, 2012.

[11] H. Kim and K. Hur, "Expanded adoption of HTS cables in a metropolitan area and its potential impact on the neighboring electric power grid," *IEEE Transactions on Applied Superconductivity*, vol. 22, no. 3, p. 5800704, 2012.

[12] T. Nam, J. Shim, and K. Hur, "The beneficial role of SMES coil in dc lines as an energy buffer for integrating large scale wind power," *IEEE Transactions on Applied Superconductivity*, vol. 22, no. 3, p. 5701404, 2012.

[13] J. Shim, T. Nam, J. Jang, T. Ko, M. Ahn, and K. Hur, "Towards a self-healing electric grid with superconducting fault current controllers," *IEEE Transactions on Applied Superconductivity*, vol. 22, no. 3, p. 5600904, 2012.

[14] J. Yoo, B. Park, K. An, E. Al-Ammar, K. Yashin, K. Hur, and J. Kim, "Look-ahead energy management of a grid-connected residential PV system with energy storage under time-based rate programs," *Energies*, vol. 5, no. 4, pp. 1116–1134, 2012.

[15] K. Sun, K. Hur, and P. Zhang, "A new unified scheme for controlled power system separation using synchronized phasor measurements," *IEEE Transactions on Power Systems*, vol. 26, no. 3, pp. 1544–1554, 2011.

[16] K. Hur, M. Boddeti, N. Sarma, J. Dumas, J. Adams, and S. Chai, "High-wire act," *IEEE Power and Energy Magazine*, vol. 8, no. 1, pp. 37–45, 2010.

[17] K. Hur and S. Santoso, "Estimation of system damping parameters using analytic wavelet transforms," *IEEE Transactions on Power Delivery*, vol. 24, no. 3, pp. 1302–1309, 2009.

[18] K. Hur and S. Santoso, "On two fundamental signatures for determining the relative location of switched capacitor banks," *IEEE Transactions on Power Delivery*, vol. 23, no. 2, pp. 1105–1112, 2008.

[19] K. Hur and S. Santoso, "Distance estimation of switched capacitor banks in utility distribution feeders," *IEEE Transactions on Power Delivery*, vol. 22, no. 4, pp. 2419–2427, 2007.

[20] K. Hur, S. Santoso, and I. Gu, "On the empirical estimation of utility distribution damping parameters using power quality waveform data," *EURASIP Journal on Applied Signal Processing*, vol. 2007, no. 1, pp. 175–175, 2007.

[21] K. Hur and S. Santoso, "An improved method to estimate empirical system parallel resonant frequencies using capacitor switching transient data," *IEEE Transactions on Power Delivery*, vol. 21, no. 3, pp. 1751–1753, 2006.

SELECTED CONFERENCE PUBLICATION

[1] H. Kim, S. Jung, F. Mosallat and K. Hur, "Validation and Compatibility Evaluation of Two Detailed Equivalent Models for Modular Multilevel Converter using PSCAD/EMTDC," in *IEEE Power Engineering Society General Meeting*, IEEE, 2013 (Submitted).

[2] J. Shim, Y. Cho, S. Kim, S. Min and K. Hur, "Enhanced Frequency Regulation Service using Hybrid Energy Storage System against Increasing Power-Load Variability," in *IEEE Power Engineering Society General Meeting*, IEEE, 2013 (Submitted).

[3] G. SON, K. HUR, J. PARK, S. BAEK, U. LEE, and Y. CHUNG, "Computationally efficient sub-module selection scheme for voltage balancing controller of modular multilevel converter," 2012 CIGRE.

[4] S. Kiwhele, D. Min, H.J. Kim, and K. Hur, "Modeling and analysis of bipolar HVDC interlink for Tanzania power grid," in *IEEE Power Engineering Society General Meeting*, IEEE, July 22$\tilde{2}$4, 2012.

[5] D. Min, J. Yoo, J. Heo, and K. Hur, "A survey of signal processing algorithms for estimating power system modal parameters," in *the 54th International Midwest Symposium on Circuits and Systems(MWSCAS)*, IEEE, pp. 1–4, 2011.

[6] K. Min, C. Jung, K. Hur, and Y. Moon, "Output feedback PID-based governor control to improve generator damping for power system stabilization," in *IFAC World Congress*, vol. 18, no. 1, pp. 4964–4970, 2011.

[7] J. Yoo, B. Park, K. Hur, "Context awareness-based disaggregation of residential load consumption," in *IFAC World Congress*, vol. 18, no. 1, pp. 13691–13695, 2011.

[8] H. Kim, T. Nam, K. Hur, B. Chang, J. Chow, and R. Entriken, "Dynamic interactions among multiple FACTS controllers: a survey," in *IEEE Power Engineering Society General Meeting*, IEEE, pp. 1–8, 2011.

[9] S. Santoso, K. Hur, and Z. Zhou, "Induction machine modeling for distribution system analysis-a time domain solution," in *IEEE Transmission and Distribution Conference and Exhibition, 2005/2006*, IEEE, pp. 583–587, 2006.

[10] K. Hur and S. Santoso, "Analysis and modeling of dynamic overvoltage phenomena due to transformer energizing," in *IEEE Power Engineering Society General Meeting*, IEEE, pp. 1126–1130, 2005.

[11] S. McCormick, K. Hur, S. Santoso, A. Maitra, and A. Sundaram, "Capacitor bank predictive maintenance and problem identification using conventional power quality monitoring systems," in *IEEE Power Engineering Society General Meeting*, IEEE, pp. 1846–1850, 2004.

[12] K. Woo, S. Kim, and K. Hur, "A study on the design and operation of modular cell manufacturing systems," *Proceedings of the 4th Intelligent Manufacturing Systems*, pp. 165–170, 1997.

INTERNATIONAL PATENTS

[1] K. Sun, K. Hur, and P. Zhang, "Application of phasor measurement units (pmu) for controlled system separation," May 17 2012, US Patent 2012/0123602 A1.

[2] K. Hur, S. Lee, and M. Park, "Apparatus and method of suppressing low speed ripple current of a single-phase inverter," Feb. 10 2004, US Patent 6,690,587 B2.

BOOK CHAPTER

[1] K. Hur and S. Santoso, "Power quality," *Computational Intelligence in Power Engineering, Springer*, pp. 199–234, 2010.