KIN CHEONG SOU

ASSOCIATE PROFESSOR • ELECTRICAL ENGINEERING & COMPUTER SCIENCE, NATIONAL SUN YAT-SEN UNIVERSITY, TAIWAN

sou12@mail.nsysu.edu.tw +886-905957077 Kaohsiung, Taiwan

EDUCATION

PH.D. IN ELECTRICAL ENGINEERING AND COMPUTER SCIENCE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science 2008

MASTER OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Aero Astro 2003

BACHELOR OF SCIENCE IN AERONAUTICS, NANJING UNIVERSITY OF AERONAUTICS AND ASTRONAUTICS
College of Civil Aviation 2000

RESEARCH EXPERIENCE

Tenured Associate Professor in Electrical Engineering :
- Feb 2022 to present
- Department of Electrical Engineering
- National Sun Yat-sen University, Kaohsiung, Taiwan

Assistant Professor in Electrical Engineering :
- Feb 2017 to Jan 2022
- Department of Electrical Engineering
- National Sun Yat-sen University, Kaohsiung, Taiwan

Assistant Professor in Mathematical Sciences :
- Mar 2013 to Nov 2016
- Department of Mathematical Sciences
- Chalmers University of Technology, Gothenburg, Sweden

Postdoctoral Researcher :
- Oct 2010 to Mar 2013
- Automatic Control Lab
- KTH Royal Institute of Technology, Stockholm, Sweden

Postdoctoral Researcher :
- Oct 2008 to Oct 2010
- Department of Automatic Control
- Lund University, Lund, Sweden

RESEARCH GRANTS

- "Application of graph decomposition theory in the optimal analysis and planning of large-scale smart electricity grids," Ministry of Science and Technology, Taiwan, PI, Aug 2017 to Jul 2019.
- "Joint design optimization of power dispatch and storage sizing and placement in networks with renewable generations," Ministry of Science and Technology, Taiwan, PI, Aug 2017 to Jul 2018.
- "Optimal dispatch of flexibility resources in power systems with high penetration of renewables," Ministry of Science and Technology, Taiwan, PI, Aug 2020 to Jul 2022.
- "Evaluation of wind power curtailment rate and wind power curtailment risk," NCKU Research & Development Foundation, Taiwan, PI, Jan 2021 to Jul 2021.
- "Design of BMS for lithium-ion battery – modelling and estimation of SOC and SOH," Industry Technology Research Institute, Taiwan, Co-PI, Jun 2021 to Nov 2021.
- "Literature Survey on Electric Power System Resilience," Industry Technology Research Institute, Taiwan, PI, Apr 2023 to Dec 2023.
- "Bilinear programming optimization for real-time optimal power flow and network reconfiguration," National Science and Technology Council, Taiwan, PI, August 2023 to July 2024.
- "SOH estimation for lithium iron phosphate batteries," Industry Technology Research Institute, Taiwan, PI, Jan 2024 to Dec 2025.
- "Survey on Overseas Electric Power System Resilence Metrics and Planning Practices," Industry Technology Research Institute, Taiwan, PI, June 2024 to Dec 2024.
- "Worst-Case Load Flow Analysis Using Optimization-Embedded Fixed-Point Iterations," National Science and Technology Council, Taiwan, PI, August 2024 to July 2026.
- "Advanced Technology Development for Microgrids at Distribution Level: Prototype Design, Function Verification, and Field Testing," National Science and Technology Council, Taiwan, Co-PI, July 2025 to June 2026.
- "Algorithm and Application of Uncertainty Quantification in Power Flow Analysis for Electric Power Systems with Renewable Energy Resources," National Science and Technology Council and Taiwan Power Company, Taiwan, PI, November 2025 to October 2026.
- "Proactive Resilience Enhancement for Electric Power Grids," National Science and Technology Council, Taiwan, PI, April 2026 to March 2029.

INVITED RESEARCH VISITS

- Hong Kong University of Science and Technology (Guangzhou), China, Aug 2025
- City University of Hong Kong, Hong Kong, June 2025
- KTH Royal Institute of Technology, Sweden, Oct 2024
- Gachon University, South Korea, Aug 2023
- Lund University, Sweden, Sep 2022
- KTH Royal Institute of Technology, Sweden, Sep 2022
- Hong Kong University of Science and Technology, Hong Kong, Sep 2018
- Chulalongkorn University, Thailand, Dec 2017, Dec 2018
- University of Peradeniya, Sri Lanka, Dec 2017
- University of Louvain, Belgium, Apr 2013

ACADEMIC, INDUSTRIAL AND ADMINISTRATIVE SERVICES

- IEEE IAS Annual Meeting, local committee member, 2025
- Expert committee member, 電力可靠與韌性推動管理辦公室, Ministry of Economic Affairs, Taiwan, 2023 to 2024
- Director, International Master's Program in Electric Power Engineering (IMEPE) of National Sun Yat-sen University, Taiwan, 2024 to present
- Academic editor, International Transactions on Electrical Energy Systems, Feb 2022 to Mar 2024
- Topic editor, MDPI Journals, Special Topic on Energy Systems Planning, Operation and Optimization in Net-Zero Emissions
- Technical program committee member
  - 2013 ACM BuildSys
  - IEEE International Future Energy Electronics Conference (IEEE IFEEC 2021)
- Frequent reviewer
  - IEEE Transactions on Control of Network Systems
  - IEEE Transactions on Power Systems

LIST OF PUBLICATIONS

- **Submitted:**

S1: C.-R. Liou, **K. C. Sou**, Y.-C. Hsieh, C.-C. Huang, P.-I. Pan, C.-Y. Wu, L.-Y. Sung, K.-Y. Chang, F.-J. Liang,"State of Health Estimation for $LiFePO_4$ Batteries Using Incremental Capacity Analysis," under review.

S2: S. Z. Khong, **K. C. Sou**, F. Al farisi, J.-H. Liu, "Stabilizing Ideal Transformer Model Tuning for Power-Hardware-in-the-Loop Simulation Based on Mixed Passivity and Small-Gain Properties," under review.

S3: D. Zhao, C. Chen, **K. C. Sou**, S. Z. Khong, "Characterization and Reduction of Network Asymmetry: A Phase-Rank Perspective," under review.

S4: S. Z. Khong, L. Su, **K. C. Sou**, A. Rantzer, "A unifying input-output approach to synchronisation analysis of nonlinear system networks," under review.

- **Book and book chapter:**

B1: N. Andreasson, A. Evgrafov, M. Patriksson, E. Gustavsson, Z. Nedelkova, **K.C. Sou**, M. Onnheim, "An Introduction to Continuous Optimization (third edition)", *Studentlitteratur AB*, Lund, Sweden, 2016, ISBN: 9789144115290.

B2: G. Dan, **K.C. Sou**, H. Sandberg, "Power-system state-estimation security: attacks and protection schemes," in *Smart Grid Communications and Networking*, Cambridge University Press, 2012.

- **Journal:**

J1: **K.C. Sou**, G. Malmer, L. Thorin, O. Samuelsson, "Power Distribution Network Reconfiguration for Distributed Generation Maximization," Electric Power Systems Research, vol. 255, Jun, 2026.

J2: F. Chen, X. Wang, L. Harnefors, S. Z. Khong, J. Kukkola, M. Routimo, L. Zhao, D. Wang, H. Sandberg, **K. C. Sou**, K. H. Johansson. "Assessment, Cause Localization, and Mitigation for Small-Signal Stability Risks in Multi-Parallel Grid-Forming Converter Systems," IEEE Transactions on Smart Grid, vol. 16, no. 6, Nov, 2025.

J3: **K.C. Sou**, S.Z. Khong, H. Sandberg, "Real-time Worst-Case Load Flow for Distribution Systems with Power Injection Uncertainties," IEEE Transactions on Power Systems, vol. 41, no. 1, Jan, 2026.

J4: F. Chen, S. Z. Khong, L. Harnefors, X. Wang, D. Wang, H. Sandberg, L. Zhao, M. Routimo, J. Kukkola, **K. C. Sou**, K. H. Johansson, "An Extended Frequency-Domain Passivity Theory for MIMO Dynamics Specifications of Voltage-Source Inverters," IEEE Transactions on Power Electronics, vol 40, no. 2, Feb, 2025.

J5: F. Chen, X. Wang, L. Harnefors, S. Z. Khong, D. Wang, L. Zhao, **K. C. Sou**, M. Routimo, J. Kukkola, H. Sandberg, K. H. Johansson, "Limitations of using passivity index to analyze grid-inverter interactions," IEEE Transactions on Power Electronics, vol 39, no. 11, Nov, 2024.

J6: **K.C. Sou**, H. Sandberg, "Resilient Scheduling of Control Software Updates in Radial Power Distribution Systems," *IEEE Transactions on Control of Network Systems*, vol. 11, no. 3, Sep, 2024.

J7: K.R. Lin, C.C. Huang, **K.C. Sou**, "Lithium-Ion Battery State of Health Estimation Using Simple Regression Model Based on Incremental Capacity Analysis Features," Energies, vol 16, no. 20, Oct, 2023.

J8: X. Wu, **K.C. Sou**, J. Lu, "A Fenchel Dual Gradient Method Enabling Regularization for Nonsmooth Distributed Optimization over Time-varying Networks," *Optimization Methods and Software* , vol. 38, no. 4, Mar, 2023.

J9: **K.C. Sou**, J. Lu, "Relaxed Connected Dominating Set Problem for Power System Cyber-Physical Security," *IEEE Transactions on Control of Network Systems*, vol 9, no. 4, Dec 2022.

J10: M.G. de Medeiros, **K.C. Sou**, H. Sandberg, "Minimum-time Secure Rollout of Software Updates for Controllable Power Loads," *Electric Power Systems Research*, volume 189, Dec 2020.

J11: **K.C. Sou**, "Protection Placement for Power System State Estimation Measurement Data Integrity," *IEEE Transactions on Control of Network Systems*, vol. 7, no. 2, Jun 2020.

J12: **K.C. Sou**, "Minimum Equivalent Precedence Relation Systems," *Discrete Applied Mathematics*, vol. 233, Aug 2017.

J13: W. Sun, E.G. Strom, F. Brannstrom, **K.C. Sou**, Y. Sui, "Radio Resource Management for D2D-based V2V Communication," *IEEE Transactions on Vehicular Technology*, vol. 65, no. 8, pp. 6636-6650, Aug 2016.

J14: A. Teixeira, **K.C. Sou**, H. Sandberg, K.H. Johansson, "Secure Control Systems: A Quantitative Risk Management Approach," *IEEE Control Systems Magazine*, vol. 35, no. 1, pp. 24-45, Feb 2015.

J15: J.M. Hendrickx, K.H. Johansson, R.M. Jungers, H. Sandberg, **K.C. Sou**, "Efficient Computations of a Security Index for False Data Attacks in Power Networks," *IEEE Transactions on Automatic Control*, vol. 59, no. 12, pp. 3194-3208, Dec 2014.

J16: G. Shi, **K.C. Sou**, H. Sandberg, K.H. Johansson, "A Graph-theoretic Approach on Optimizing Informed-node Selection in Multi-agent Tracking Control," *Physica D: Nonlinear Phenomena*, volume 267, pages 104-111, January 2014.

J17: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Data Attack Isolation in Power Networks Using Secure Voltage Magnitude Measurements," *IEEE Transactions on Smart Grid*, volume 5, issue 1, pages 14-28, January 2014.

J18: A. Sootla, **K.C. Sou**, "Parametrized Model Reduction Based on Semidefinite Programming," *Automatica*, volume 49, issue 9, pages 2840-2844, September 2013.

J19: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Computing Critical k-tuples in Power Networks," *IEEE Transactions on Power Systems*, volume 27, issue 3, pages 1511-1520, August 2012.

J20: O. Vukovic, **K.C. Sou**, G. Dan, H. Sandberg, "Network-aware Mitigation of Data Integrity Attacks on Power System State Estimation," *IEEE Journal on Selected Areas on Communications*, volume 30, issue 6, July 2012.

J21: **K.C. Sou**, H. Sandberg, K.H. Johansson, "On the Exact Solution to a smart Grid Cyber-security Analysis Problem," *IEEE Transactions on Smart Grid*, volume 4, issue 2, pages 856-865, June 2013.

J22: **K.C. Sou**, A. Rantzer, "Controller Reduction via Minimum Rank Matrix Approximation," *Automatica*, volume 48, issue 6, pages 1069-1076, June 2012.

J23: **K.C. Sou**, A. Rantzer, "On a Generalized Matrix Approximation Problem in the Spectral Norm," *Linear Algebra and its Applications*, volume 436, issue 7, pages 2331-2341, April 2012.

J24: **K.C. Sou** and A. Megretski and L. Daniel, "A Quasi-Convex Optimization Approach to Parameterized Model Order Reduction," *IEEE Transactions on Computer Aided Design*, volume 27, issue 3, March 2008.

J25: **K.C. Sou** and O. de Weck. "Fast Time Domain Simulation for Large-Order LTI Systems," *International Journal for Numerical Methods in Engineering*, volume 63, issue 5, pages 618–708, 2005.

- **Peer-reviewed conference:**

C1: **K.C. Sou**, S.Z. Khong, H. Sandberg, "Low-Complexity Worst-Case Load Flow for Power Distribution Systems with Injection Uncertainties," *IEEE Power & Energy Society General Meeting*, Austin, Texas, USA, July 2025.

C2: C.-R. Liou, **K.C. Sou**, Y.-C. Hsieh, C.-C Huang, P.-I. Pan, C.-Y. Wu, L.-Y. Sung, K.-Y. Chung, F.-J. Liang, "State of Health Estimation for LiFePO4 Batteries Using Incremental Capacity Analysis," *IEEE IAS Annual Meeting*, Taipei, Taiwan, June 2025.

C3: D. Wang, D. Zhu, **K.C. Sou** and J. Lu, "Distributed Online Optimization with Coupled Inequality Constraints over Unbalanced Directed Networks," *IEEE Conference on Decision and Control*, Singapore, Dec 2023.

C4: **K.C. Sou**, K. Giron, "Joint Renewable Generation Maximization and Radial Distribution Network Reconfiguration," 2022 IEEE ISGT ASIA, 11th International Conference on Innovative Smart Grid Technologies (Asia), Singapore, Nov 2022.

C5: **K.C. Sou**, H. Sandberg, "Resilient Scheduling of Control Software Updates in Power Distribution Systems ," *IEEE Conference on Decision and Control*, Cancun, Mexico, Nov 2022.

C6: **K.C. Sou**, "Branch Decomposition Based Dynamic Programming Method for Double Dominating Set Problem in Power Systems Applications," *The 5th IEEE International Future Energy Electronics Conference (IFEEC 2021)*, Taipei, Taiwan, Nov 2021.

C7: T.C. Tang, **K.C. Sou**, "Dispatch Coordination of smart Inverters and Energy Storage in Power Distribution Systems," *The 5th IEEE International Future Energy Electronics Conference (IFEEC 2021)*, Taipei, Taiwan, Nov 2021.

C8: T.C. Tang, **K.C. Sou**, "Systemwise Dispatch Coordination of Smart Inverter and Energy Storage for Renewable Integration in Power Distribution Systems," *The 4th International Workshop on Power Engineering in Remote Islands (IWPI2021)*, Jan 2021.

C9: M.G. de Medeiros, **K.C. Sou**, H. Sandberg, "Minimum-time Secure Rollout of Software Updates for Controllable Power Loads", *The 21st Power Systems Computation Conference (PSCC)*, Porto, Portugal, Feb 2020.

C10: **K.C. Sou**, "Protection placement for state estimation measurement data integrity," *2019 IEEE International Conference on Industrial Cyber Physical Systems (ICPS)*, Taipei, Taiwan, May 2019.

C11: **K.C. Sou**, "Power Network Measurement Placement Using Graph Optimization," *IEEE R10 Humanitarian Technology Conference*, Colombo, Sri Lanka, Dec 2018.

C12: X. Wu, J. Lu, **K.C. Sou**, "Distributed Fenchel Dual Gradient Methods Enabling a Smoothing Technique for Nonsmooth Optimization," *IEEE Conference on Decision and Control*, Miami, USA, Dec 2018.

C13: **K.C. Sou**, J. Lu, "Relaxed connected dominating set problem with application to secure power network design," *American Control Conference (ACC)*, Seattle, USA, May 2017.

C14: **K.C. Sou**, "A branch-decomposition approach to power network design," *American Control Conference (ACC)*, Boston, USA, Jul 2016.

C15: **K.C. Sou**, "Relaxed Connected Dominating Set Problem with Application to Secure Power Network Design", *Reglermote* 2016, Gothenburg, Sweden, Jun 2016.

C16: **K.C. Sou**, "Minimum Equivalent Precedence Relation Systems," *IEEE Conference on Decision and Control*, December 2015.

C17: W. Sun, E. Strom, F. Brannstrom, **K.C. Sou**, Y. Sui, "D2D-based V2V communications with latency and reliability constraints," *Globecom Workshops*, 2014.

C18: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Nonserial dynamic programming with applications in smart home appliances scheduling-Part I: Precedence graph simplification," *European Control Conference*, July 2014.

C19: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Nonserial dynamic programming with applications in smart home appliances scheduling-Part II: Nonserial dynamic programming," *European Control Conference*, July 2014.

C20: **K.C. Sou**, M. Kordel, J. Wu, H. Sandberg, K.H. Johansson, "Energy and CO2 efficient scheduling of smart home appliances," *European Control Conference*, July 2013.

C21: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Detection and Identification of Cyber-Attacks in Power System State Estimation," *American Control Conference*, June 2012.

C22: **K.C. Sou**, H. Sandberg, K.H. Johansson, "Electric Power Network Security Analysis via Minimum Cut Relaxation," *IEEE Conference on Decision and Control*, December 2011.

C23: **K.C. Sou**, J. Weimer, H. Sandberg, K.H. Johansson, "Scheduling Smart Home Appliances Using Mixed Integer Linear Programming," *IEEE Conference on Decision and Control*, December 2011.

C24: O. Vukovic, **K.C. Sou**, G. Dan, H. Sandberg, "Network-layer Protection Schemes against Stealth Attacks on State Estimators in Power Systems," *IEEE SmartGridComm 2011*, October 2011.

C25: **K.C. Sou**, A. Rantzer, "Controller Reduction with Closed Loop Error Guarantee," *IEEE Conference of Decision and Control*, December 2010.

C26: **K.C. Sou**, A. Rantzer, "A SVD Based Controller Reduction Method," *SICE Annual Conference*, August 2010.

C27: **K.C. Sou**, A. Rantzer, "On the Minimum Rank of the Generalized Matrix Approximation Problem in the Maximum Singular Value Norm," *The 19th International Symposium on Mathematical Theory of Networks and Systems*, June 2010.

C28: **K.C. Sou** and A. Rantzer, "A Singular Value Decomposition Based Closed Loop Stability Preserving Controller Reduction Method," *American Control Conference*, June 2010.

C29: A. Sootla and **K.C. Sou**, "A Model Simplification Method for Parameter-Dependent Systems," *American Control Conference*, June 2010.

C30: **K.C. Sou** and A. Megretski and L. Daniel, "Convex Relaxation Approach to the Identification of the Wiener-Hammerstein Model," *IEEE Conference on Decision and Control*, December 2008.

C31: **K.C. Sou** and A. Megretski and L. Daniel, "Bounding L2 Gain System Error Due to Approximations of the Nonlinear Vector Field," *IEEE/ACM International Conference on Computer-Aided Design*, November 2007.

C32: **K.C. Sou** and A. Megretski and L. Daniel, "A Quasi-Convex Optimization Approach to Parameterized Model Order Reduction," *IEEE/ACM Design Automation Conference*, June 2005, Anaheim, California, USA.

C33: **K.C. Sou** and O. de Weck, "Fast Time Domain Simulation for Large-Order LTI Systems," *The 44th AIAA/ASME/ASCE/AHS Structures, Structural Dynamics, and Materials Conference*, April 2003, Norfolk, Virginia, USA.