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Publications

Designing Digitally Enabled Proactive Maintenance Systems in Power Distribution Grids: A Scoping Literature Review
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Seyed Sakha, M. & Shaker, H. R., 2017, *Proceedings of the 3rd International Conference on Mechatronics and Robotics Engineering*. Association for Computing Machinery, p. 23-29

Adverse Condition and Critical Event Prediction in Cranfield Multiphase Flow Facility

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A New Computationally Efficient Algorithm for Optimal Sensors and Actuators Placement for Large-Scale Systems
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A new fault-location method for HVDC transmission-line based on DC components of voltage and current under line parameter uncertainty
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Shaker, H. R., 7. Jul 2015, *Proceedings of the 6th International Conference on Modeling, Simulation and Applied Optimization*. IEEE Press, p. 1-2

Control Configuration Selection for Multivariable Switched Dynamical Systems and Processes

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Lazarova-Molnar, S., Kjærgaard, M. B., Shaker, H. R. & Jørgensen, B. N., May 2015, *Proceedings of the 4th International Conference on Smart Cities and Green ICT Systems (SMARTGREENS)*. Helfert, M., Krempels, K.-H., Donnellan, B. & Klein, C. (eds.). Institute for Systems and Technologies of Information, Control and Communication, Vol. 1. p. 306-312

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Integration of DG Sources for Compensation of Unbalanced Loads in Power Grid

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Integration of Renewable Energy for the Harmonic Current and Reactive Power Compensation

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Generalized frequency-interval balanced model reduction method

Shaker, H. R., 1. Jan 2013, *Proceedings of the IEEE Conference on Decision and Control*. IEEE Press, p. 5546-5551 6 p. 6760763

Lyapunov stability for continuous-time 2D nonlinear systems

Shaker, H. R., 1. Jan 2013, *Proceedings of the IEEE Conference on Decision and Control*. IEEE Press, p. 4586-4589 4 p. 6760602

Generalized cross-gramian for linear systems

Shaker, H. R., 1. Dec 2012, *Proceedings of the 2012 7th IEEE Conference on Industrial Electronics and Applications, ICIEA 2012*. p. 749-751 3 p. 6360824

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Shaker, H. R. & Stoustrup, J., 26. Nov 2012, *Proceedings of the American Control Conference*. p. 6294-6299 6 p. 6315372

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Control Reconfigurability of Bilinear Hydraulic Drive Systems

Shaker, H. R. & Tahavori, M., 2011, *International Conference on Fluid Power and Mechatronics (FPM)*. IEEE Press, p. 477-480

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Shaker, H. R. & Wisniewski, R., 2011, In: *International Journal of Systems Science*. 42, 8, p. 1277-1291

Time-Weighted Balanced Stochastic Model Reduction

Tahavori, M. & Shaker, H. R., 2011, *The 50th IEEE Conference on Decision and Control and European Control Conference*. IEEE Press, p. 7777-7781

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Shaker, H. R. & Tahavori, M., Sept 2010, In: *Multidimensional Systems and Signal Processing*. 21, 3, p. 293-299

Accuracy Enhanced Stability and Structure Preserving Model Reduction Technique for Dynamical Systems with Second Order Structure

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Model Reduction of Hybrid Systems

Shaker, H. R., 2010, Department of Electronic Systems, Aalborg University, Denmark.

Stability Analysis for a Class of Switched Nonlinear Systems

Shaker, H. R. & How, J. P., 2010, In: *Proceedings of the American Control Conference*. p. 2517 - 2520

Switched controller order reduction

Shaker, H. R., Wisniewski, R. & Tabatabaeipour, S., 1. Dec 2009, *2009 IEEE International Conference on Control and Automation, ICCA 2009*. p. 2237-2242 6 p. 5410439

Switched systems reduction framework based on convex combination of generalized gramians

Shaker, H. R. & Wisniewski, R., 1. Dec 2009, In: *Journal of Control Science and Engineering*. 2009, 710478.

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Shaker, H. R. & Wisniewski, R., 1. Nov 2009, In: *Journal of Dynamic Systems, Measurement and Control*. 131, 6

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Shaker, H. R., 1. Feb 2009, In: *Journal of Control Theory and Applications*. 7, 1, p. 57-62 6 p.

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On Exact/Approximate Reduction of Dynamical Systems Living on Piecewise linear Partition

Shaker, H. R. & Wisniewski, R., 2009, *Proceedings MATHMOD 09 Vienna: ARGESIM Report no. 34 and 35*. Breitenecker, F. & Troch, I. (eds.). Vienna University of Technology

On Model Reduction of Hybrid Systems

Shaker, H. R. & Wisniewski, R., 2009, *CICADA workshop on Hybrid Systems and Model Reduction*.

Frequency-domain balanced stochastic truncation for continuous and discrete time systems

Shaker, H. R., 1. Apr 2008, In: *International Journal of Control, Automation and Systems*. 6, 2, p. 180-185 6 p.

Accuracy and efficiency enhanced nonlinear model order reduction

Gheisari, Y., Shaker, H. R., Torabi, M. A. & Samavat, M., 1. Dec 2007, *Proceedings of the 2006 IEEE Conference on Computer Aided Control Systems Design, CACSD*. p. 3007-3012 6 p. 4064821

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Shaker, H. R., Samavat, M. & Ghareveisi, A. A., 1. Dec 2007, *Proceedings of the 2006 IEEE Conference on Computer Aided Control Systems Design, CACSD*. p. 3003-3006 4 p. 4064820

Improved model predictive control of discrete-time hybrid systems with mixed inputs

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Accuracy and Efficiency Enhancement in Nonlinear Model Order Reduction

Shaker, H. R. & Samavat, M., 2007, In: *International Journal of Modelling, Identification and Control*. 2, 2, p. 147-153

Accuracy and efficiency enhancement in model order reduction of large circuits

Shaker, H. R., Tabatabaeipour, M., Samavat, M. & Gharaveisi, A. A., 1. Dec 2006, *Midwest Symposium on Circuits and Systems*. Vol. 1. p. 266-270 5 p. 4267125

A clustering-based bounded-error approach for identification of PWA hybrid systems

Tabatabaei-Pour, M., Gholami, M., Salahshoor, K. & Shaker, H. R., 1. Dec 2006, *9th International Conference on Control, Automation, Robotics and Vision, 2006, ICARCV '06*. 4150167

A new mixed method for relative error model order reduction

Shaker, H. R., Tabatabaeipour, M., Samavat, M. & Gharaveisi, A. A., 1. Dec 2006, *Midwest Symposium on Circuits and Systems*. Vol. 2. p. 356-360 5 p. 4267364

Recursive identification of piecewise affine hybrid systems

Tabatabaei-Pour, M., Gholami, M., Shaker, H. R. & Moshiri, B., 1. Dec 2006, *9th International Conference on Control, Automation, Robotics and Vision, 2006, ICARCV '06*. 4150225

Accuracy enhancement in HiMAT aircraft controller reduction

Shaker, H. R. & Samavat, M., 17. Nov 2006, *1st International Symposium on Systems and Control in Aerospace and Astronautics*. Vol. 2006. p. 250-254 5 p. 1627621

Accuracy Enhanced Model Reduction Technique for Nonlinear Dynamical Systems

Shaker, H. R. & Samavat, M., 2006, *Proceedings of 2nd Int. Symposium on Chaos and Nonlinear Dynamical Systems*. Iran: Aerospace Research center

Accuracy Enhancement in Model Reduction and Some Benchmark Examples

Shaker, H. R. & Samavat, M., 2006, *Proceedings of ASME Int. Conf. on Modeling and Simulation*. Kuala Lumpur, Malaysia

Frequency-Domain Second Order Structure Preserving Model Reduction

Shaker, H. R. & Samavat, M., 2006, *Proceedings of 14th International Annual Conference on mechanical Engineering*. iranian society of mechanical engineering (ISME)

Accuracy Enhancement in HiMAT Aircraft Controller Reduction Using a Recently Developed Balanced Technique

Shaker, H. R. & Samavat, M., 2005, In: *Int. J. of Automatic Control and System Engineering*. 5, 4, p. 31-36

Prizes

Best poster award in International Conference on Medium and High Temperature PEM Fuel Cells,

Shaker, H. R. (Recipient), 2012

IEEE Senior Member

Shaker, H. R. (Recipient), 2018

Winner of best poster award in International Conference on Medium and High Temperature PEM Fuel Cells,

Shaker, H. R. (Recipient), 2012

Winner of the Best Paper Award at 5th IEEE International Conference on Power Engineering, Energy and Drives (Powereng2015)

Shaker, H. R. (Recipient), 2015

Winner of the Best Paper Award at IEEE International Conference on Big Data and Smart City,

Shaker, H. R. (Recipient), 2016

Winner of the best poster award in Fuel Cells Science Technology

Shaker, H. R. (Recipient), 2012

Activities

Discover Energy (Journal)

Shaker, H. R. (Associate editor)

Apr 2023 → ...

International Conference on Electrical and Electronics Engineering

Shaker, H. R. (Technical program committee)

2023

International Conference on Signal Processing and Machine Learning

Shaker, H. R. (Technical program committee)
2023

International Conference on Smart Energy Grid Engineering

Shaker, H. R. (Technical program committee)
2023

International Conference on System Reliability and Safety

Shaker, H. R. (Technical program committee)
2023

10th IEEE Conference on Smart Energy Grid Engineering, SEGE 2022

Shaker, H. R. (Technical program committee)
2022

International Conference on Signal Processing and Machine Learning

Shaker, H. R. (Technical program committee)
2022

9th IEEE International Conference on Smart Energy Grid Engineering, SEGE 2021

Shaker, H. R. (Technical program committee)
2021

2020 7th International Conference on Electrical and Electronics Engineering (ICEEE)

Shaker, H. R. (Technical program committee)
2020

Energy Informatics (Journal)

Shaker, H. R. (Editor)
2019 → ...

5th International Conference on Electrical and Electronics Engineering

Shaker, H. R. (Technical program committee)
2018

Advances in Mechanical Engineering (Journal)

Shaker, H. R. (Editor)
Jan 2015 → Jan 2018

2nd International Conference on Mechatronics and Robotics Engineering

Shaker, H. R. (Organizer)
2015 → 2016

International Journal of System Control and Information Processing (Journal)

Shaker, H. R. (Editor)
2014 → ...

Project proposals/research grant applications for researchers and PhD students at SDU

Shaker, H. R. (Participant)
2014

Systems Science & Control Engineering (Journal)

Shaker, H. R. (Editor)

2012 → ...

Hovedvejlederkursus for ph.d.-vejledere / Course for ph.d.-supervisors

Shaker, H. R. (Participant)

2011

Problem Based Learning (PBL)

Shaker, H. R. (Participant)

2011

University Pedagogy for Assistant Professors

Shaker, H. R. (Participant)

2010 → 2012

Massachusetts Institute of Technology

Shaker, H. R. (Visiting researcher)

1. Jul 2009 → 1. Jan 2010

Basic Course in Pedagogy for University Teachers

Shaker, H. R. (Participant)

2009

Pedagogical view: Educational practice - Basis/values

In today's dynamic world, brimming with endless possibilities and exciting challenges, I firmly believe that education must transcend traditional boundaries. As a devoted university professor in the vibrant field of Energy Informatics, I see myself as a catalyst for unleashing the boundless potential within my students. My mission is not only to impart knowledge but also to empower them to navigate the ever evolving landscape of science and technology with confidence and enthusiasm.

Guided by the belief that education is a journey of discovery, I embrace the role of a mentor, guiding my students through their transformative learning experiences. I find immense joy in illustrating how the concepts we explore in the classroom are not just theoretical constructs but powerful tools to tackle real-world problems. Witnessing their eyes light up with excitement as they grasp the impact of their newfound knowledge is truly gratifying.

Early in my teaching journey, I had the privilege of being part of Aalborg University, an institution renowned for its pioneering problem-based, project-organized model - the illustrious PBL - Aalborg Model. Embracing this revolutionary approach has allowed me to sharpen my teaching and mentoring skills, and more importantly, it has elevated my students' learning experiences to new heights. In my classes, I foster an environment that encourages interdisciplinary exploration and collaborative learning. I blend a myriad of teaching methodologies, from engaging workshops and virtual interactions to vibrant face-to-face sessions. By seamlessly integrating these diverse techniques, I ensure that each student's unique learning style is addressed, sparking their curiosity and igniting their passion for knowledge.

However, the heart of my teaching philosophy lies in my unyielding commitment to student feedback.

I firmly believe that the best educators are perpetual learners. I eagerly embrace the invaluable insights shared by my students, as their feedback not only shapes my approach but also cultivates a sense of care and dedication towards their growth and success.

I recognize the significance of personal connections in the learning process. To build a supportive and encouraging atmosphere, I warmly welcome informal conversations with my students, nurturing an environment where they feel empowered to express their thoughts and seek guidance. Together, we embark on a transformative journey, where even the smallest adjustments can pave the way for profound learning outcomes.

My passion for teaching lies not only in the dissemination of knowledge but in the cultivation of future leaders, innovators, and problem solvers. It is a privilege to guide my students towards a world of possibilities, where they can confidently embrace the challenges that await them beyond graduation.

Incorporating my pedagogical expertise with the dynamic PBL - Aalborg Model, I wholeheartedly commit to inspiring a generation of Energy Informatics enthusiasts, empowering them to create a brighter and more sustainable tomorrow.

Pedagogical Education

- Two-year Course of "University Pedagogy for Assistant Professors", Aalborg University, Denmark , 2010-2012.

- Course / workshop on "intercultural classroom", Aalborg University,Denmark, 2012.

- Hovedvejlederkursus for ph.d.-vejledere / Course for PhD-supervisors, Aalborg University, Denmark, 2011.
- Problem Based Learning (PBL), Aalborg University , Denmark, 2010.
- Basic Course in Pedagogy for University Teachers, Aalborg University, Denmark, 2009.

Teaching experience

Lecturer

Lectured, designed lesson plans, homework assignments, and exams for the following courses:

1. BSc Course, Mechatronics 2, Aalborg University, Aalborg, Denmark, 2011 and 2012.
2. BSc Course, Cybernetics, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2013.
3. BSc Course, Feedback Control Systems, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2013.
4. BSc Course, Control Engineering, University of Southern Denmark, Odense, Denmark, 2014-2022.
5. BSc Course, Engineering Optimization, University of Southern Denmark, Odense, Denmark, 2017, 2018, and 2022.
6. BSc Course, Expert in Teams, University of Southern Denmark, Odense, Denmark, 2018, and 2019.
7. MSc Course, Linear Optimal Control, Aalborg University, Aalborg, Denmark, 2010.
8. MSc Course, State-Space Control, Aalborg University, Aalborg, Denmark, 2010-2012.
9. MSc Course, Stochastic Process, Aalborg University, Aalborg, Denmark, 2011-2013.
10. MSc Course, Multivariable and Nonlinear Control Methods, Aalborg University, Aalborg, Denmark, 2012, and 2013.
11. MSc Course, Dynamics and Control of processes and systems, University of Southern Denmark, Odense, Denmark, 2015-2019.
12. MSc Course, Modeling and Optimization of Energy Processes, University of Southern Denmark, Odense, Denmark, 2016-2019.
13. MSc Course, Advanced Optimization for Energy Applications, University of Southern Denmark, Odense, Denmark, 2020.
14. MSc Course, Advanced Optimization, University of Southern Denmark, Odense, Denmark, 2022.
15. MSc Course, Data-Based Modeling Methods, University of Southern Denmark, Odense, Denmark, 2015.
16. MSc Course, Fault Detection and Diagnosis in Industrial Systems, University of Southern Denmark, Odense, Denmark, 2016, and 2019.
17. MSc Course, Fault Detection and Diagnosis in Engineering Systems, University of Southern Denmark, Odense, Denmark, 2020, and 2021.
18. MSc Course, Model Predictive Control, University of Southern Denmark, Odense, Denmark, 2022.
19. MSc Course, System Identification, Aalborg University, Aalborg, Denmark, 2011, and 2012.
20. MSc Course, Fuzzy Logic and Neural Networks, Aalborg University, Aalborg, Denmark, 2011, and 2012.
21. PhD Course, Model Reduction, Aalborg University, Aalborg, Denmark, 2008.
22. Industrial/PhD Course, Efficient Modeling and Control of Complex Systems, Aalborg University, Aalborg, Denmark, 2011-2013.

Supervisor

Supervised and mentored students and junior researchers/faculty members. Held regular office hours and supervisory meetings, evaluated the performance for the following projects and education:

1. BSc Project Supervision, Mechatronic Design, Control, and Optimization of an Inverted Pendulum, 2011.
2. BSc Project Supervision, Mechatronic Design, Modeling, and Control of a Small-Scale Wave Energy Converter, in collaboration with WAVE STAR, Aalborg University, Aalborg, Denmark, 2011.
3. BSc Project Supervision, Implementation of a voice coil actuator in Wave-Star PTO Systems, Aalborg University, Aalborg, Denmark, 2011.
4. BSc Project Supervision, Integration of a Sound Reception System in Ulstein System, in collaboration with Ulstein Power & Control, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2013.
5. BSc Project Supervision, Logging, and Visualization of ship ballast operations, in collaboration with MMC Green Technology, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2013.
6. BSc Project Supervision, Camera-based distance measurement on a DP vessel, in collaboration with Rolls-Royce, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2014.
7. BSc Project Supervision, Searchlight on board, in collaboration with Rolls-Royce, Norwegian University of Science and Technology (NTNU), Ålesund, Norway, 2014.
8. BSc Project Supervision, Rule-Based Fault Detection for Smart Buildings, University of Southern Denmark, Odense, Denmark, 2018.
9. BSc Project Supervision, Fault Detection and Diagnostics of Ventilation Systems of OU44 Smart Building at SDU, University of Southern Denmark, Odense, Denmark, 2018.
10. BSc Project Supervision, Adverse effects and critical event prediction in the electric power grid, University of Southern Denmark, Odense, Denmark, 2018.
11. BSc Project Supervision, Analysis of the Danish Electric Billing Rules with Focus on Power Quality, University of Southern Denmark, Odense, Denmark, 2021.
12. BSc Project Supervision, Data Validation for Smart Buildings, University of Southern Denmark, Odense, Denmark, 2021.
13. BSc Project Supervision, Digital Twin-Based Fault Detection and Diagnosis in the District Heating System, University of Southern Denmark, Odense, Denmark, 2023.
14. MSc Project Supervision: "Analysis and Control of Wind Turbines," in collaboration with VESTAS, Aalborg University, Aalborg, Denmark, 2011.

15. MSc Project Supervision: "Identification of Varying Dynamics in Hydraulic Actuator Systems," Aalborg University, Aalborg, Denmark, 2011.
 16. MSc Project Supervision: "System Identification and control for Fuel Cells Systems for the Automotive industry," in collaboration with Serenergy, Aalborg University, Aalborg, Denmark, 2011.
 17. MSc Project Supervision: "Control of a Servo Hydraulic Robot," Aalborg University, Aalborg, Denmark, 2012.
 18. MSc Project Supervision: "Modeling and Control of a Robot Manipulator," Aalborg University, Aalborg, Denmark, 2012.
 19. MSc Project Supervision: "Neuro-fuzzy Control of a Hydraulic Crane," Aalborg University, Aalborg, Denmark, 2012.
 20. MSc Project Supervision: "Feedforward Control for a Reformed Methanol Fuel Cell System," in collaboration with Serenergy, 2012 (won best AAU ET thesis award).
 21. MSc Project Supervision: "Industrial Kitchen Energy Optimization," in collaboration with Milan-Ingenieurbuero, University of Southern Denmark, 2015.
 22. MSc Project Supervision: "Adverse Condition and Critical Event Prediction in Commercial Buildings," in collaboration with NASA's Ames Research Center, University of Southern Denmark, 2016.
 23. MSc Project Supervision: "Analysis and Design of Model-Based Fault Diagnosis Systems for Building Systems and Components," University of Southern Denmark, 2018.
 24. MSc Project Supervision: "Fault and Critical Event Prediction in Commercial Buildings," in collaboration with NASA's Ames Research Center, University of Southern Denmark, 2019.
 25. MSc Project Supervision: "Data Validation in Fjernvarme Fyn's District Heating System," University of Southern Denmark, 2021.
 26. MSc Project Supervision: "Optimization of a Renewable Energy Portfolio with Power-to-X Integration: Capital Investment and Operational Scheduling," University of Southern Denmark, 2023.
 27. PhD Project supervision: "Motor-Integrated Variable Speed Drives," Aalborg University, Aalborg, Denmark, 2011-2012.
 28. PhD Project supervision: "Reformed Methanol Fuel Cell Systems - and their use in Electric Hybrid Systems," Aalborg University, Aalborg, Denmark, 2012-2013.
 29. PhD Project supervision: "Fault Location in Electric Distribution Systems," Persian Gulf University, Bushehr, Iran, 2015-2020.
 30. PhD Project supervision: "Software Tools and Methods for Building Fault Detection and Diagnostics," University of Southern Denmark, Odense, Denmark, 2015-2018.
 31. PhD Project supervision: "Fault-tolerant portfolio optimization in Smart Grid," University of Southern Denmark, Odense, Denmark, 2015-2018.
 32. PhD Project supervision: "Analysis of Electronic Loads on Electrical Measurements, Power Quality, and Billing," University of Southern Denmark, Odense, Denmark, 2018-2021.
 33. PhD Project supervision: "Automated Data Validation and Reconstruction, Proactive and Predictive Maintenance of Energy systems and processes," University of Southern Denmark, Odense, Denmark, 2020-2023.
 34. PhD Project supervision: "Automatic Data Validation, Fault, and Anomaly Detection and Diagnosis for Operation- and Energy Performance Improvements," University of Southern Denmark, Odense, Denmark, 2021-2024.
 35. PhD Project supervision: "Smart Asset Maintenance and Management for Electric Power Distribution Grids," University of Southern Denmark, Odense, Denmark, 2022-2025.
 36. PhD Project supervision: "Application of state estimation and machine learning techniques for energy management of microgrids," University of Southern Denmark, Odense, Denmark, 2023-2025.
 37. Postdoctoral Project Supervision/Mentorship: "Diagnostics of Buildings Energy Performance," University of Southern Denmark, Odense, Denmark, 2018-2020.
 38. Supervisor for Assistant Professors in: "Teacher Training Programme for Assistant Professors and Postdocs," University of Southern Denmark, Odense, Denmark, 2018-2020.
- Internship Coordinator for the BSc students 2011-2013 Aalborg University · Aalborg, Denmark