

## Takashi Hikihara

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*born August 9, 1958*

Kyoto University Executive Vice-President for Information Infrastructure and  
Library Management  
Director General of Kyoto University IIMC

Department of Electrical Engineering  
Graduate School of Engineering  
Kyoto University  
Katsura, Kyoto, 615-8510, Japan  
work:+81(75) 753-5334

home:

E-mail: [hikihara.takashi.2n@kyoto-u.ac.jp](mailto:hikihara.takashi.2n@kyoto-u.ac.jp)

Permanent address: hikihara.takashi.2n@kyoto-u.jp

[http://www-lab23.kuee.kyoto-u.ac.jp/en/index.php?T\\_Hikihara](http://www-lab23.kuee.kyoto-u.ac.jp/en/index.php?T_Hikihara)

ORCID ID: <https://orcid.org/0000-0002-0029-4358>



### **EDUCATION**

- Mar. 23, 1990      Ph.D., in Electrical Engineering, Kyoto University  
Graduate School of Engineering, Department of Electrical Engineering  
Advisor: Professor Yoshisuke Ueda  
Thesis: Studies on Performance Characteristics of Synchronous Generator  
Based on Magnetic Flux
- Mar. 23, 1987      Kyoto University, Graduate School of Engineering, Department of Electrical Engineering  
Research guidance certification of PhD course.

### **EXPERIENCES**

- Oct. 2022 – Present      Executive Vice-President for Information Infrastructure and Library  
Management
- Apr. 2021 – Present      Director General of Kyoto University IIMC
- Oct. 2012 – Sept. 2022      Director General and Dean of Kyoto University Library Network
- July. 2012 - Present      Professor, Kyoto University, Japan  
Graduate School of Engineering, Department of Electrical Engineering  
Advanced Electrical System Theory Lab.
- Aug. 2001 - June.2012      Professor, Kyoto University, Japan  
Graduate School of Engineering, Department of Electrical Engineering  
Power Conversion & System Control Lab.

Apr. 1997 - Jul. 2001            Associate Professor, Kyoto University, Japan  
Graduate School of Engineering, Department of Electrical Engineering  
Power System Lab.

Apr. 1994 - Mar. 1997           Associate Professor, Kansai University, Japan  
Department of Electrical Engineering

Apr. 1993 - Mar. 1994           Visiting Researcher, Cornell University, USA  
Sibley School of Aerospace and Mechanical Engineering

Apr. 1991 - Mar. 1993           Lecturer, Kansai University, Japan  
Department of Electrical Engineering

Apr. 1987 - Mar. 1991           Assistant Professor, Kansai University, Japan  
Department of Electrical Engineering

(Others)

Apr. 2004 - Sept. 2004           part-time Lecturer, Nagoya Institute of Technologies, Japan  
Graduate School of Engineering

Apr. 2001 - Mar. 2004           part-time Lecturer, Tsukuba University, Japan  
Graduate School of Engineering

Apr. 1997 - Mar. 1999           part-time Lecturer, Kansai University, Japan  
Department of Electrical Engineering

Apr. 2000 - Sept. 2000           part-time Lecturer, Kyoto Institute of Technology, Japan  
School of Art & Engineering, Department of Electronic and Information Engineering

Apr. 1999 - Sept. 1999           same as above

Apr. 1996 - Sept. 1996           same as above

### **CURRENT RESEARCH TOPICS (Keywords)**

#### **1. Nonlinear Dynamics**

Analysis of nonlinear system,  
Controlling chaos,  
Nonlinear coupled resonators,  
Intrinsic Localized Mode and its applications

#### **2. Electric Power Network and System**

Application of distributed power sources  
Reachability analysis of nonlinear system  
Power packetization and routing

#### **3. Power Conversion and System Control**

Applications of wide bandgap semiconductor power devices  
Development of high frequency gate drives and its applications

(Keywords)

Nonlinear dynamics, Electric power network and its design, Data driven control

## Activities

2016 /1 – 2019/12 Member Advisory Board, arXiv.org

2013 /5 - 2014/5 President of Engineering Sciences Society, the Institute of Electronics, Information and Communication Engineers (IEICE)

2012 /5 - 2013/5 Next-President of Engineering Sciences Society, the Institute of Electronics, Information and Communication Engineers (IEICE)

2010 /5 - 2012 /5 Vice-President of Engineering Sciences Society, the Institute of Electronics, Information and Communication Engineers (IEICE)

2008 /5 - 2010 /5 ECC2009, International Program Committee, Member

2008 /5 - 2010 /5 ISCIE, Board Member (Editorial Affairs)

2007 /5 - 2009 /5 IEEJ, Board Member (Globalization Promotion Charge)

2006 /5 - 2008 /5 ISCIE, Board Member (Publication Affairs)

2006 /5 - 2007 /5 IEICE, Technical Group of Nonlinear Problems, Chairman

2005 /9 - 2006 /9 NOLTA2006, Steering Committee, Finance Chair

2005 /5 - 2006 /5 IEICE, Technical Group of Nonlinear Problems, Vice-Chairman

2004 /10 - 2006 /9 IEEJ, Research Group of Functional Application of Magnetic Suspension

2004 /5 - 2006/4 IEEJ, IEEJ, Industrial Applications Society, Board Member (Editorial Affairs)

2004 /3 - 2005 /9 International Symposium on Linear Drives for Industry Applications (LDIA) 2005, Program Committee, Chairman

2004 /5 - 2004 /12 NOLTA04, Program Committee, Chairman

2002 /4 - 2004 /3 IEEJ Research Group of Modeling and Simulation Technology on Power Electronics Circuits, Member

2001 /4 - 2002 /4 Power Conversion Conference - Osaka 2002, Steering Committee, Program Committee, Member

2001 /4 - 2002 /5 NOLTA'01, Technical Program Committee, Member

2001 /4 - 2003 /3 IEEJ, Industrial Applications Society, Board Member

2000 /6 - 2002 /5 IEEJ, Research Group of Coupling Problems on Magnetic Levitation Systems, Chairman

2000 /4 - 2002/3 International Symposium on Linear Drives for Industry Applications (LDIA) 2001, Program Committee, Chairman

1999 /7 - 2001 /8 IEEJ Research Group of Modeling and Simulation Technology on Power Electronics Circuits, Member

1999 /4 - 2003 /3 IEEJ Annual Meeting, Japan Industry Applications Society Conference, Program Committee, Member

1999 /4 - 2001 /3 IEEJ Research Group of Technical Terms on Linear Drive Systems, Member

1998 /4 - 2006 /5 IEEJ, Technical Group on Linear Drive Technology, Member

1998 /4 - 2001 /3 IEEJ, Research Group of Design Technology on Nonlinear Electronic Circuits, Member

1998/4 - 2000 /4 IEEJ, Research Group of Nonlinear Technology in Magnetic Levitation Systems, Chairman

1997/ 5 - 1998 /5 The Institute of Systems, Control, and Information Engineers (ISCIE), SCI'98 Steering Committee, Member

1997 /2 - 1998 /4 International Symposium on Linear Drives for Industry Applications (LDIA) 1998, Program Committee, Member

1996/ 5 - 2002 /4 IEICE, Technical Group of Nonlinear Problems, Member

1996 /4 - 2001 /3 IEEJ, Research Group of Analytical Method for Nonlinear Circuit, Member  
 1996 /4 - 1998/3 IEEJ Research Group of Application Technology of Magnetic Levitation System, Secretary  
 1995 /5 - 1996 /4 IEICE, Workshop on Circuits and Systems in Karuizawa, Steering Committee  
 Vice-Chairman  
 1995 /10 - 1996 /10 International Symposium on Nonlinear Theory and Its Application '96, Technical  
 Program Committee, Member  
 1994 /7 - 2008 /5 IEICE, Nonlinear Theory and its Applications, Organizing Committee, Member  
 1994 /7 - 1995 /12 International Symposium on Nonlinear Theory and Its Application (NOLTA) '95  
 Steering Committee, Member  
 1994 /5 - 1996 /5 Institute of Electronics, Information and Communication Engineers (IEICE), Technical  
 Group of Nonlinear Problems, Secretary  
 1994 /4 - 1996 /3 International Symposium of Linear Drive and Its Applications, Steering Committee,  
 Member  
 1994 /4 - 1996 /3 IEEJ, Research Group of Industrial Application of Magnetic Levitation Technology,  
 Assistant Secretary  
 1992 /4 - 1994/3 Institute of Electrical Engineers, Japan (IEEJ) , Research Group of Magnetic Levitation  
 System, Assistant Secretary  
 1987 /4 - 2002/8 Japan Society for Power Electronics, Board member

Others:

Member of Council for Science and Technology of MEXT, Japan

Roles of Cabinet Office, JST

### **Editorial Activities**

2018 /12 – Now IET, Editorial Board of The Journal of Engineering. Associate Editor  
 2015 /6 – 2019 /6 Editor-in-Chief, NOLTA, IEICE  
 2010 /9 – 2014/12 Journal of Vibration and Control, Editorial Board  
 2008 /5 - 2010/5 Journal of System, Control and Information, Vice-Editor  
 2008 /3 - 2010/12 European Journal of Control, Associate Editor  
 2006 /1 - 2008 /3 Journal of Circuits, Systems, and Computers, Associate Editor  
 2004 /5 - 2005 /10 IEICE, Transactions on Fundamentals of Electronics, Communications and Computer  
 Science, NOLTA04 Special Section, Associate Editor  
 2003 /5 - 2004 /9 IEICE Transactions on Fundamentals of Electronics, Communications and Computer  
 Science on Fundamentals, NOLTA03 Special Section, Associate Editor  
 2002 /4 - 2003 /5 IEICE Transactions on Fundamentals of Electronics, Communications and Computer  
 Science, NOLTA02 Special Section, Associate Editor  
 2001 /4 - 2002 /5 IEICE Transactions on Fundamentals of Electronics, Communications and Computer  
 Science, Special Section on NOLTA01, Associate Editor  
 1999 /9 - 2000 /10 IEICE Transactions on Fundamentals of Electronics, Communications and Computer  
 Science, Special Section on NOLTA00, Secretary of Editorial Board, Associate Editor  
 1999 /4 - 2003 /3 IEEJ, Transactions on Industrial Applications, Associate Editor  
 1998 /4 – 2002 /5 IEICE, Transactions on Fundamentals of Electronics, Communications and Computer  
 Science, Associate Editor

1997 /4 -1999 /3 The Institute of Systems, Control, and Information Engineers (ISCIE), Associate Editor  
 1995/10 - 1996 /10 IEICE Transactions on Fundamentals of Electronics, Communications and Computer Science, Special Section on NOLTA96, Associate Editor

### **Invited International Talk**

1. Phenomena and Boundary in Nonlinear Dynamical System, Plenary Talk, NOLTA2022(2022.12.14).
2. Tutorial Lecture, IEEEWiPDA-Asia2020 (2020.9.23)
3. Unite Nations Open Science Conference, United Nations Hamashold Library, NY, USA (2019.11.19)
4. Power packetization and routing, Conference on Intelligent Unmanned Swarm System Control Theory and Applications, Oct. 19, 2019, Beijing Institute of Technology, Beijing, China
5. Control of Intrinsic Localized Mode in Coupled Cantilever Array, IUTAM Symposium on Nonlinear Dynamics for Advanced Technologies and Engineering Design (NDATED), 27-30 July 2010, Aberdeen, UK.
6. Resonant manipulation of particles in nanosystems, RANM2009, Kuala Lumpur, Malaysia, Aug. 25 (2009).
7. Spectral Decomposition of Transient Vector Flow : Duffing System and Chaos, CCM8-ECCOMAS2008, Venice, Italy, June 30- July 5 (2008).
8. Dynamics in manipulation and actuation of nano-particles, ICAND2007, Kauai, Hawaii, USA, Sept. 24-27 (2007).
9. Wave's Travel by Instability of Mode in Coupled Pendulums, SIAM Conference on Applications of Dynamical Systems (DS07), May 28-June 1, 2007, Snowbird, Utah, USA (2007.5.31).
10. Control of nonlinear dynamics in nanosystem - from sensing to actuation -, Conference on Coupled Nonlinear Oscillators and Applications in Nanosystems, CNOAN, Santa Barbara, CA, USA (2007.5.25).
11. Georgia Tech., Lab. Seminar (non official; by Prof.K.Mischaikow), Nov. 9, 2005.
12. Georgia Tech., Lab. Seminar (non official; by Prof.R.Gregoriev), Nov. 7, 2005.
13. Princeton Univ., Dynamics Seminar (non official; by Prof. P.J.Holems), Dec. 13, 2002.

### **AWARDS**

- |     |      |  |
|-----|------|--|
| 1.  | 2021 | ISCIE, Best Paper Award 2021   |
| 2.  | 2020 | Minister of Education, Culture, Sports, Science and Technology Award |
| 3.  | 2019 | NOLTA Society: Distinguished Contribution Award.                     |
| 4.  | 2019 | Best Paper Award 2019, SICE, #Takeda Award"                          |
| 5.  | 2015 | ISCIE, Best Paper Award 2015   |
| 6.  | 2015 | Best Paper Award 2015, IEICE, "Kiyasu Zenichi Prize"                 |
| 7.  | 2015 | Best Paper Award 2015, MDPI energies                                 |
| 8.  | 2013 | ISCIE, Best Paper Award 2013   |
| 9.  | 2011 | Fellow, IEICE  |
| 10. | 2011 | Outstanding Contribution to Institute Award, IEICE-ESS               |
| 11. | 2009 | ISCIE, Best Paper Award 2009   |
| 12. | 2008 | ACC2008, Best Presentation in Session Award                          |
| 13. | 2005 | IEEJ, IAS Activity Performance Award                                 |
| 14. | 2001 | IEEJ, IAS Activity Performance Award                                 |
| 15. | 1993 | IEEJ, Paper presentation award                                       |
| 16. | 1990 | IEEJ Kansai chapter, Young engineers incentive award                 |

## **Institutes**

IEEE, APS, SIAM, IEEJ, IEICE, ISCIE

## **Publications**

### **Books**

1. Nonlinear Dynamics of Nanosystems (2009, Wiley-VCH Verlag), Eds. By Radons, G., Rumpf, Benno , Schuster, Heinz Georg, Chap. 9.
2. Handbook of Chaos Control (2007, Wiley-VCH), Eds. by Eckehard Schoel and Heinz Georg Schuster Chapter 36.
3. Power Electronics (in Japanese) (Asakura, 2000) Part.
4. Chaos Impact (Morikita, 1999) Translation.
5. Magnetic Levitation and Magnetic Bearing (in Japanese), pp.134-136 (Colona, 1993).

### **Published Paper (Reviewed)**

1. Rutvika Manohar and Takashi Hikihara, Design of a Stand-alone Hybrid Dispersed Generation Network Unified by Passivity Based Control, Royal Society Open Science, Vol. 11, Issue 7 (2024).
2. Yanran Wang, Tatsuya Baba, and Takashi Hikihara, Robot formation control in nonlinear manifold using Koopman operator theory, IEICE NOLTA, Vol.E15-N, No.2, pp.501-517 (2024).
3. Takahiro Mamiya, Shiu Mochiyama, and Takashi Hikihara, Router for wireless power packet transmission: Design and application to intersystem power management, IEEE Journal of Emerging and Selected Topics in Industrial Electronics, vol.5, no.2, pp.475-487 (2024).
4. Hirotaka Araki and Takashi Hikihara, Shift manipulation of intrinsic localized mode in ac driven Klein Gordon lattice, Physics Letters A, Vol. 493, 5, 129270 (2024).
5. Shiu Mochiyama and Takashi Hikihara, Stochastic Power Processing through Logic Operation of Power Packets, Royal Society Open Science, Vol.10, 230583 (2023).
6. Yuto Saito, Tomoya Shiono, Tomoyuki Tamura, Hiroshi Arai, Takashi Hikihara, and Nobuo Satoh, Power Distribution Technology based on Transmission of Power Packets via Conducting Metal Body, IEEJ Transactions on Industry Applications, Vol.144 No.1 pp.16–22 DOI: 10.1541/ieejias.144.16(2024).
7. Hajime Takayama, Suhei Fukunaga, and Takashi Hikihara: Digital-twin-compatible Optimization of Switching Characteristics for SiC MOSFETs using Genetic Algorithm, IEEE Journal of Emerging and Selected Topics in Industrial Electronics, Volume: 4, Issue: 4, 1024-1033 (2023)
8. Naoki Fujiwara, Nodoka Asayama, and Takashi Hikihara, Differential Game-based Safety Operation of Microgrids Including Virtual Synchronous Generator, Trans. of The Institute of System Control and Information Engineers, Vol.36, No.9, pp.316-326 (2023)
9. Shuhei Fukunaga, Hajime Takayama, and Takashi Hikihara, Slew rate control of switching transient for SiC MOSFET in boost converter using digital active gate driver, IET Power Electronics (2022)
10. Yohei Kono, Yoshihiko Susuki, and Takashi Hikihara, Characterizing scale dependence of effective diffusion driven by fluid flows, Phys. Rev. E 105, 045103 (2022).
11. Shiu Mochiyama, Kazuhiro Koto, and Takashi Hikihara, Routing optimization on power packet dispatching system based on energy loss minimization, IEICE NOLTA, Volume 13 Issue 1 Pages 139-148 (2022).

12. Hajime Takayama, Takafumi Okuda, and Takashi Hikiyara, Digital Active Gate Drive of SiC MOSFETs for Controlling Switching Behavior --- Preparation toward Universal Digitization of Power Switching, *International Journal of Circuit Theory and Applications*, 50, 183-196 (2022).
13. Nobuo Sato, Jimin Oh, and Takashi Hikiyara, Photo radiation pressure at resonance of frequency modulated micro cantilever, *NOLTA, IEICE*, Vol.E12-N, No.4, 718-725 (2021).
14. Shota Inagaki, Shiu Mochiyama, and Takashi Hikiyara, Electric Power Processing Using Logic Operation and Error Correction, "Royal Society Open Science, Vol. 8, Iss. 7, 8202344 (2021).
15. Yuma Murakawa and Takashi Hikiyara, Output Series-Parallel Connection of Passivity-Based Controlled DC-DC Converters: Generalization of Asymptotic Stability, *IEEE Trans. CAS I: Regular Papers*, Vol. 68, Iss. 4, 1750 - 1759 (2021).
16. Seongcheol Baek, Hiroyasu Ando, and Takashi Hikiyara, Decentralized Algorithms for Consensus-Based Power Packet Distribution, *NOLTA, IEICE*, Vol.12, No.2, pp.181 - 193 (2021).
17. Shiu Mochiyama, Takafumi Okuda, and Takashi Hikiyara, "Power Packet Dispatching with Shared Power Line: Experimental Verification for Industrial Applications", *IEEE Journal of Emerging and Selected Topics in Industrial Electronics*, Vol. 2, Iss. 2, 164-172 (2021)
18. Kazuki Hashimoto and Takashi Hikiyara, "Equivalent Circuit of Interleaved Air-Core Toroidal Transformer Derived from Analogy with Coupled Transmission Lines", *IEICE, ELEX*, 17 Issue 21 Pages 20200262 (2020).
19. Toko Mannari, Takafumi Okuda, and Takashi Hikiyara, "Prediction of restriction in output current by reactant flow in redox flow battery for compensating load variations", *International Journal of Circuit Theory and Applications*, Vol.49, Iss.4 1121-1132 (2021)
20. Yanran Wang and Takashi Hikiyara, "Two Dimensional Swarm Formation in Time-invariant External Potential: Modelling, Analysis, and Control", *AIP Chaos*, 30, 093145 (2020)
21. Manuel Sánchez Tejada, Takashi Hikiyara, "The Broken Symmetry of Output Currents in a Matrix Converter and Its Recovery Control", *Journal of Circuits, Systems, and Computers*, World Scientific, Vol.30, No.4, 2150072 (2020).
22. Shiu Mochiyama and Takashi Hikiyara, Impulsive torque control of biped gait with power packets, *Nonlinear Dynamics*, 102, pages 951–963 (2020).
23. Rutvika Manohar and Takashi Hikiyara, Phase synchronization of autonomous AC grid system with passivity-based control, *International Journal of Circuit Theory and Applications*, Vol. 48, Iss. 6, 906-918 (2020).
24. Shinji Katayama and Takashi Hikiyara, "Power packet router with power and signal switches for a single power packet", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vo.67, Iss.12, 3242-3246 (2020).
25. Kazuki Hashimoto, Takafumi Okuda, and Takashi Hikiyara, Measurement of internal magnetic flux density distribution in air-core toroidal transformer under high-frequency excitation, *Review of Scientific Instruments* 91, 044703 (2020).
26. Baek Seongcheol, Hiroyasu Ando, Takashi Hikiyara, Consensus-Based Distribution of Power Packets and Decentralized Control for Routing, *AIP, Chaos*, 30, 033115 (2020).
27. Rutvika Manohar and Takashi Hikiyara, Phase synchronization of autonomous AC grid system with passivity-based control, *International Journal of Circuit Theory and Applications*, Vol.48, Iss.6, 906-918 (2020).

28. Naomitsu Yoshida, Ryo Takahashi, and Takashi Hikiara, Power Regeneration from DC Motor with Bidirectional Router in Power Packet Dispatching System, IEEE Transactions on Circuits and Systems II: Express Briefs, Express Letter, Vol.67, Iss.12, 3088-3092 (2020).
29. Yuma Murakawa, Yohei Sadanda, and Takashi Hikiara, Parallelization of Boost and Buck Type DC-DC Converters by Individual Passivity-Based Control, IEICE Trans. A Vol.E103-A, No.3, 589-595 (2020).
30. Rutivika Manohar and Takashi Hikiara, Dynamic behaviour of a ring coupled boost converter system with passivity-based control, NOLTA, IEICE, Vol. 11, Iss. 1, 109-122 (2020).
31. Hikaru Hoshino, Yoshihiko Susuki, John Koo, and Takashi Hikiara. Structural Analysis and Control of a Model of Two-Site Electricity and Heat Supply. ASME. J. Dyn. Sys., Meas., Control. 2019;141(10):101004. doi:10.1115/1.4043703.
32. Fredrik Raak, Yoshihiko Susuki, Shinya Eguchi, and Takashi Hikiara, Role of deterministic electromechanical conversion in short-term wind power fluctuations: A case study in Japan, Physical Review Applied, Phys. Rev. Applied 12, 034013 (2019).
33. Toko Mannari; Takafumi Okuda, Takashi Hikiara, Model for charging/discharging dynamics of cells in redox flow battery with transport delay, Pyisica Scripta Volume 94, 1-9 (2019).
34. Sinji Katayama, Ryo Takashashi, and Takashi Hikiara, Experimental Verification of Distributed Energy on Demand Control Using Wireless Communication on Power Packet Dispatching System, Trans. IEICE Vol. J102–A No. 9 pp. 240–248 (2019).
35. Nodoka Asayama, Takashi Hikiara, On the Use of Reachable Set for Safe Operation in Microgrid, Trans. of the Institute of Systems, Control and Information Engineers, Vol.32, Iss.4, 137-144 (2019)
36. Shiu Mochiyama and Takashi Hikiara, Packet-based feedback control of electrical drive and its application to trajectory tracking of manipulator, International Journal of Circuit Theory and Applications, Vol.47, Iss. 4, 612-632 (2019). <http://dx.doi.org/10.1002/cta.2603>
37. Manuel Sanchez and Takashi Hikiara, Symmetry Recovering of an AC/AC Converter Working in a Chaotic Regime, NOLTA, IEICE, Vol. 10, Issue 2, pp.131-139 (2019).
38. Manuel Sanchez, Takafumi Okuda, and Takashi Hikiara, "Stabilization of Mode in Imbalanced Operation of Matrix Converter by Time-Delayed Feedback Control" , International Journal of Circuit Theory and Applications, John Wiley, DOI: 10.1002/cta.2556.
39. Shinya Nawata, Atsuto Maki, Takashi Hikiara, Power packet transferability via symbol propagation matrix, Proc. R. Soc. A 2018 474 20170552; DOI: 10.1098/rspa.2017.0552.
40. Shinya Nawata, Ryo Takahashi, and Takashi Hikiara, "Design possibility for covert power packet transfer using asynchronous sampling", NOLTA, IEICE, Vol. 9 Issue 3, pp. 374-381 (2018). <https://doi.org/10.1587/nolta.9.374>
41. Y. Kono, Y. Susuki, H.Mitsunori I. Mezic, and T.Hikiara, Multiscale Modeling of In-Room Temperature Distribution with Human Occupancy Data: A Practical Case Study, Journal of Building Performance Simulation, 11, 2, 145-163 (2018).
42. M.Shintani, Y. Nakamura, K.Oishi, M. Hiromoto, T.Hikiara, and T.Sato, "Surface-Potential-Based Silicon Carbide Power MOSFET Model for Circuit Simulation", IEEE Trans. Power Electronics (2018.2. 13). DOI: 10.1109/TPEL.2018.2805808
43. Takafumi Okuda, Takashi Hikiara, Skew Calibration with High-Power and High-Speed Pulse Generator for Oscilloscope, IEEJ Trans. on Electronics, Information and Systems, Vol.138, Iss.1, 37-40 (2018).



44. Ryosuke Meda, Takafumi Okuda, Takashi Hikihiro, Analysis of dynamic characteristics of SiC SBDs at high switching frequency based on junction capacitance, *Japanese Journal of Applied Physics* 57(4S):04FF01 DOI10.7567/JJAP.57.04FF01
45. Rochelle Nieuwenhuis, Madoka Kubota, M. R. Flynn, Masayuki Kimura, Takashi Hikihiro, and Vakhtang Putkaradze, Dynamics regularization with tree-like structures, *Applied Mathematical Modelling*, Volume 55, Pages 205-223 (2018).
46. Toko Mannari and Takashi Hikihiro, Transient Behavior of Redox Flow Battery Connected to Circuit Based on Global Phase Structure, *NOLTA, IEICE*, Volume 9, Issue 1, 137-147 (2018) .
47. Fredrik Raak, Yoshihiko Susuki, Kazuhisa Tsuboki, Masaya Kato, and Takashi Hikihiro, Quantifying Smoothing Effects of Wind Power via Koopman Mode Decomposition: A Numerical Test with Wind Speed Predictions in Japan, *NOLTA, IEICE*, Vol.8, Iss.4, 342-357(2017).
48. Shiu Mochiyama, Ryo Takahashi, and Takashi Hikihiro, Close-loop Angle Control of Stepper Motor Motor Fed by Power Packets, *IEICE Trans. A*, Vol.E100-A, No.7, pp.1571-1574, (2017).
49. Shiu Mochiyama, Ryo Takahashi, and Takashi Hikihiro, Trajectory control of manipulator fed by power packets, *International Journal of Circuit Theory and Applications*, vol.45, no.6, pp.832--842, (2017).
50. Tsukasa Saito, Yoshihiko Susuki, and Takashi Hikihiro, Mode Switching Control for Output Levelling of In-Home Electric Power System : Experiment and Performance Evaluation, *Trans. IEICE*, J100-A(5), 183-194 (2017).
51. H.Hoshino, Y.Susuki, Koo T.John, and T.Hikihiro, Nonlinear Control of Combined Heat and Power Plants in a Two-site Regional Energy System -Simultaneous Regulation of Electricity and Gas Flow, *Transactions of the Institute of Systems, Control and Information Engineers*, Vol. 30 Iss. 5, 157-166 (2017).
52. Yohei Kono, Yoshihiko Susuki, and Takashi Hikihiro, Applications of Koopman Mode Decomposition to Modeling of Heat Transfer Dynamics in Building Atriums-II, *Transactions of the Society of Instrument and Control Engineers*, Vol.53, No.2, 188--197 (2017).
53. Yohei Kono, Yoshihiko Susuki, Mitsunori Hayashida, Takashi Hikihiro, Applications of Koopman Mode Decomposition to Modeling of Heat Transfer Dynamics in Building Atriums-I—Effective Heat Diffusion by Small-scale Air Movement—, *Transactions of the Society of Instrument and Control Engineers*, Vol.53, No.2, 123--133 (2017).
54. Michihiro Shintani, Yohei Nakamura, Masayuki Hiromoto, Takashi Hikihiro, and Takashi Sato: "Measurement and Modeling on Gate-Drain Capacitance of Silicon Carbide Vertical MOSFET," *Japanese Journal of Applied Physics*, Vol.56, No.4S, 04CR07.
55. Ryo Takahashi, Shun-ichi Azuma, Mikio Hasegawa, Hiroyasu Ando, and Takashi Hikihiro, Power Processing for Advanced Power Distribution and Control, *IEICE Transaction B Position Paper*, Vol. E100.B, Iss.6, 941-946 (2017).
56. Atsushi Yao and Takashi Hikihiro, Reprogrammable logic-memory device of a mechanical resonator, *International Journal of Non-linear Mechanics*, Vol.94, 406-416 (2017).
57. Masayuki Kimura, Yasuo Matsushita, Takashi Hikihiro, Parametric resonance of intrinsic localized modes in coupled cantilever arrays, *Physics Letters A*, 380, 2823–2827(2016).
58. Shinya Nawata, Ryo Takahashi, and Takashi Hikihiro, "Up-stream Dispatching of Power by Density of Power Packet" *IEICE Trans. Vol.E99-A*, No.12, pp.2581-2584 (2016).
59. Ryo Takahashi, Shunichi Azuma, and Takashi Hikihiro, Power Regulation with Predictive Dynamic Quantizer in Power Packet Dispatching System, *IEEE Transactions on Industrial Electronics*, 63(12),

7653-7661 (2016).

60. Yoshihiko Susuki, Igor Mezic, Fredric Raak, and Takashi Hikihara, Applied Koopman operator theory for power systems technology, *Nonlinear Theory and Its Applications*, IEICE, Vol. 7(4), 430-459 (2016).
61. Edmon Perkins, Masayuki Kimura, Takashi Hikihara, and Balakumar Balachandran, Effects of Noise on Symmetric Intrinsic Localized Modes, *Nonlinear Dynamics*, 85(1) (2016).
62. Yanzi Zhou, Ryo Takahashi, and Takashi Hikihara, Power Packet Dispatching with Features on Safety, *NOLTA, IEICE*, Vol.7, No.2, 250-265 (2016).
63. H. Hoshino, Y. Susuki, and T. Hikihara, A Lumped-Parameter Model of Multiscale Dynamics in Steam Supply Systems, *ASME Journal of Computational and Nonlinear Dynamics* 11(6), 061018 (2016).
64. Fredric Raak, Yoshihiko Susuki, and Takashi Hikihara, Data-driven partitioning of power networks via Koopman mode analysis, *IEEE Transactions on Power Systems*. Vol.31, Iss.4 (2016).
65. Y.Zhou, R.Takahashi, N.Fujii, and T.Hikihara, Power Packet Dispatching with Second-Order Clock Synchronization, *International Journal of Circuit Theory and Applications*, published(online(DOI)).
66. M.Kubota, R.Takahashi, and T.Hikihara, Active and Reactive Power in Stochastic Resonance for Energy Harvesting. *IEICE Transactions* 98-A(7): 1537-1539 (2015).
67. K.Nagaoka, K.Chikamatsu, A.Yamaguchi, K.Nakahara, and T.Hikihara, High-speed gate drive circuit for SiC MOSFET by GaN HEMT, *IEICE Electronics Express* Vol. 12, No. 11 pp. 20150285 (2015).
68. A.Kordonis, R.Takahashi, D.Nishihara, and T.Hikihara, Three-Phase Power Router and its Operation with Matrix Converter toward Smart-Grid Applications, *Energies*, 8, 3034-3046 (2015).
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**Conference Paper:** more than 200,

**Pattents:** 13



### **List of PhD Students and Title of Dissertations**

Yuma Murakawa (2023.3.24)

Application of Passivity-Based Control to Series-Parallel Connected DC-DC Converters and their Circuit Characteristics

Shinji Katayama (2022.3.24)

A Feasible Design of Power Packet Dispatching System

Yohei Kono (2021.3.23)

Diffusion and Drift Transport between Zones in Building Temperature Fields and its Data-Driven Modeling (in Japanese)

Baek Seongcheol (2021.3.23)

Dynamical Analysis and Decentralized Control of Power Packet Network

Kazuki Hashimoto (2021.3.23)

Analysis and Design of Air-Core Transformer Based on Internal Magnetic Flux Density Distribution for High-Frequency Power Converter

Rutvika Manohar Nandan (2021.3.23)

Design of Distributed Stand-alone Power Systems using Passivity-Based Control

Toko Mannari (2020.11.23)

Mass Transport and Discharging Dynamics of Redox Flow Battery for Power Supply

Manuel Antonio Sanchez Tejada (2019.9.24)

Appearance of Symmetry Breaking in AC/AC Converters and Its Recovery Methods

Shiu Mochiyama (2019.9.24)

Power-packet Based Control and Its Application in Distributed System

Fredrik Raak (2017.9.25)

Data-driven analysis of wind power and power system dynamics via Koopmanmode decomposition

Masatsugu Nakano (2017.9.25)

Research on Loss Analysis and Torque Ripple Reduction for High Performance of Permanent Magnet Synchronous Motors (in Japanese)

Hikaru Hoshino (2017.3.23)

Analysis and Control of Multiscale Dynamics in Regional Electricity and Heat Supply Systems

Shinya Nawata (2017.3.23)

Design of Electrical Energy Network Based on Power Packetization

Yanzi Zhou (2015.9.24)

Power Packet Dispatching Based on Synchronization with Features on Safety

Madoka Kubota (2015.3.23)

Energy Harvesting Characteristics of Nonlinear Oscillators under Excitation

Atsushi Yao (2015.3.23)

Logic and memory devices of nonlinear microelectromechanical resonator

Alexandros Kordonis (2015.3.23)

DYNAMIC ANALYSIS AND MODELING OF AC/AC POWER CONVERTERS FOR APPLICATIONS TO SMART-GRID SOLUTIONS

Masataka Minami (2013.3.25)

Research on Control Based on Passivity and Phase Synchronization Method in Grid Connection of Distributed Power Sources (in Japanese)

Tsuguhiro Takuno (2012.3.23)

High Frequency Switching of SiC Transistors and its Application to In-home Power Distribution

Suketu D. Naik (2011.8.26)

Investigation of Synchronization in a Ring of Coupled MEMS Resonators

Yuuichi Yokoi (2011.3.23)

Energy Conversion and its Control by Synchronization of Pendulum

Phankong Nathabhat (2010.9.24)

Characterization of SiC Power Transistors for Power Conversion Circuits Based on C-V Measurement

Masayuki Kimura (2009.3.23)

Studies on the Manipulation of Intrinsic Localized Modes in Coupled Cantilever Arrays

Mei Hua Li (2009.3.23)

Fundamental Research on the Dynamic Model Based on the Chemical Reactions of Redox Flow Batteries  
(in Japanese)

Kohei Yamasue (2007.3.23)

Studies on Time-Delayed Feedback Control of Chaos and its Application to Dynamic Force Microscopy

Katsunori Asano (2006.3.23)

Fundamental Research on the Application of High Voltage Resistant SiC FET and Diodes to Power  
Conversion Circuits (in Japanese).

Yoshihiko Susuki (2005.3.23)

Transient Dynamics and Stability Boundaries in Electric Power System with DC Transmission

## **List of Funding**

### **1. Grant-in-Aid for Scientific Research (Main proposal)**

1991.4-1992.3

Grant-in-Aid for Encouragement of Scientists(A) 03750201      Amount no record

Development of absorbtio type magnetic levitation system by linear induction motor

1992.4-1993.3

Grant-in-Aid for Encouragement of Scientists(A) 04750230      Amount no record

Study on measurement of traveking magnetic field vector of linear otor by magnetic birefringence

1998.4-2000.3

Grant-in-Aid for Scientific Research (C) 10650276, ¥ 3,500 K

Restriction of nonlinear spatio-temporal propagation of vibration in magnetically suspended elastica by power electronics technology

2000.4 - 2002.3

Grant-in-Aid for Scientific Research (C) 12650276, ¥3,500K

Study on method for restriction of electric-mechanic coupled vibration in magnetically suspended system by power conversion and control

2002.4 - 2004.3

Grant-in-Aid for Scientific Research (C) 14550264, ¥2,900K

Development of simulator of power system with DC power transmission for verification method of stability control

2006.4 - 2008.3

Grant-in-Aid for Scientific Research (B) 18360137, ¥18,590K

Design and Integration of power distribution circuit with SiC power devices with EMC estimation

2009.4 - 2011.3

Grant-in-Aid for challenging Exploratory Research 21656074, ¥3,380K

Development of mechanism for operating nano/micro structure and scavenging micro-energy

2014.4 - 2017.3

Grant-in-Aid for challenging Exploratory Research 26630176, ¥ 3,770K

Development of nonlinear resonator and converter circuit for energy harvesting from wide range spectrum of vibration

2020.4 – 2023.3

Grant-in-Aid for Scientific Research (B) 20H0215, ¥17,810K

Fundamental study of basic technology to realize digitization of small-capacity power transmission

2023.4 – 2026.3

Grant-in-Aid for Scientific Research (B) 20H01399, ¥8,970K(2023)

Development of fast self regulating digital active gate driver for SiC MOSFET

## 2. Grant-in-Aid for Scientific Research (assisted proposal)

1992.4 - 1993.3

Grant-in-Aid for Scientific Research (C) 04650285

Study on characteristics of superconducting motor with high Tc superconductor

1997.4 - 1999.3

Grant-in-Aid for Scientific Research (C) 09650441

Fundamental research on transient behavior of power system and evaluation of instability criteria

2000.4 - 2002.3

Grant-in-Aid for Scientific Research (C) 12834006

Reviewing study on power and information transfer via synchronization in coupled electrical circuit

2000.4 - 2001.3

Grant-in-Aid for Scientific Research (C)(1) 12895006

Novel development of real-time control -

Systematic approach to theory of hybrid dynamical system

2004.4 - 2006.3

Grant-in-Aid for Exploratory Research 16656089

Development of hybrid simulator for next generation power system analysis

## 3. Governmental funding

2008.10 - 2013.3

Knowledge Clusters Project (MEXT) ¥69,800K

2009.9 - 2014.3

NICT Project #142 ¥85,000K

Development on information and energy network technology for integration

2011.10 - 2012.9

Advance Low Carbon Technology (ALCA) (JST) ¥4,680K

Network Design of novel power transfer by power processing

2013.12 - 2018.3

Kyoto Area Super Cluster Program (JST) ¥42,700K

Construction of Highly-efficient Energy Utilization System for Realizing Clean and Low-environmental Load Society

2014.11 - 2016.3

SIP Program (Total ¥193,899K)

Development of low power and small sized concentrated circuits and power processing technology by SiC power devices

2018.10 - 2022.3

SIP Program, ¥8,679K

Development of ultra-fast digital controller for WBG semiconductor

#### 4. Private Funding

2002.4 - 2003.3

Iwatani Naoji Foundation      ¥2,000K

Development of linkage method of distributed power sources to power system and study on its stability

2004.4 - 2005.3

JFE 21 Century Foundation      ¥2,000K

Fundamental study on design of energy network by passive micro grid by distributed power sources

2008.4 - 2010.3

CASIO SCIENCE PROMOTION FOUNDATION      ¥3,000K

Development of gate drive circuit of SiC power devices for high speed switching