

Chulsoon Hwang

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Research Interest

High-speed Digital System Design, RF/digital Integration (RF Desensitization), Machine Learning in Hardware Design, Electromagnetic Interference (EMI), Hardware Security/Intentional EMI, and Electromagnetics

Work Experience

- 09/2023 – present Woodard Associate Professor of Excellence, Dept. Electrical and Computer Engineering, Missouri University Science and Technology, Rolla, MO (Formerly the University of Missouri Rolla, UMR)
- 09/2022 – present Associate Professor, Dept. Electrical and Computer Engineering, Missouri University Science and Technology, Rolla, MO
- 09/2016 – 08/2022 Assistant Professor, Dept. Electrical and Computer Engineering, Missouri University Science and Technology, Rolla, MO
- 07/2015– 08/2016 Post-Doctoral Fellow, Dept. Electrical and Computer Engineering, Missouri University of Science and Technology, Rolla, MO
- 07/2012– 06/2015 Senior Engineer, HSI & Advanced Electromagnetic Compatibility Lab., Samsung Electronics Co., Ltd, Suwon, Korea

Education

- 03/2009–06/2012 Ph. D. Dept. Electrical Engineering, KAIST, Daejeon, Korea (Advisor: Prof. Joungho Kim)
Thesis: On-chip Electromagnetic Bandgap Structures for Suppression of Simultaneous Switching Noise Coupling in on-chip Power Distribution Networks
- 03/2007– 02/2009 M.S. Dept. Electrical Engineering, KAIST, Daejeon, Korea (Advisor: Prof. Joungho Kim)
Thesis: Wideband Narrow Pitch Via Electromagnetic Bandgap Structure for Suppression of P/G Noise Coupling to Signal in SiP
- 03/2001– 02/2007 B.S. Dept. Electrical Engineering, KAIST, Daejeon, Korea
(Served two years in the Republic of Korea Army)

Professional Service and Society Memberships

- Associate Editor, IEEE Transactions on Signal and Power Integrity, 2021 ~ present
- University Relations, IBIS organization, 2023 ~ present
- Technical Committee Officer, Secretary & Vice Chair, IEEE EMC Society SC5 - Power Electronics EMC 2016 ~ 2024
- Technical Program Committee, Asia-Pacific International Symposium on EMC 2022
- Reviewer, IEEE Transactions (T-EMC, T-MTT, T-SIPI, T-VLSI, T-CAS1, T-CPMT, T-PE, MWCL, and Access) and various conferences
- Session Organizer/Workshop Organizer at IEEE Int. Symp. on EMC+SIPI and AP-EMC
- Senior Member, IEEE, 2018
- IEEE-HKN, 2019

Honors & Awards

- Best Paper/Best Student Paper Awards (7 best papers, 4 best student papers, 4 runner-ups)
 - Best SIPI Student Paper Award Runner-Up, *IEEE Int. Symp. EMC&SIPI*, 2024 (last author)

- Best Paper Award, *DesignCon*, 2024 (last author)
- Best SIPI Paper Award, *IEEE Int. Symp. EMC+SIPI*, 2023
- Best EMC Student Paper Award, *IEEE Int. Symp. EMC+SIPI*, 2023 (last author)
- Best SIPI Student Paper Award, *IEEE Int. Symp. EMC+SIPI*, 2023
- Best SIPI Student Paper Award Runner-Up, *IEEE Int. Symp. EMC&SIPI*, 2023 (last author)
- Best Student Paper Award, *Asia-Pacific International Symposium on EMC*, 2023 (last author)
- Best EMC Paper Award, *IEEE Int. Symp. EMC+SIPI*, 2022 (last author)
- Best EMC Paper Runner-Up, *IEEE Int. Symp. EMC+SIPI*, 2022
- Best SIPI Student Paper Runner-Up, *IEEE Int. Symp. EMC+SIPI*, 2021 (last author)
- Best Student Paper Award, *Asian Electromagnetics Conference (ASIAEM)*, 2019 (last author)
- Best SIPI Paper Award, *IEEE Int. Sym. EMC&SIPI*, 2019 (last author)
- Best Paper Award, *DesignCon*, 2019
- Best Paper Award, *DesignCon*, 2018 (last author)
- Best Paper Award, *Asia-Pacific International Symposium on EMC*, 2017 (first author)
- Missouri S&T
 - CEC Dean’s Scholar, 2022-2023
 - Outstanding Teaching Commendation, 2021
 - Faculty Research Award, 2019, 2021, 2023
- IEEE Outstanding Section Member, *IEEE St. Louis Section*, 2024
- IEEE EMC Society Technical Achievement Award, *IEEE EMC Society*, 2023
- Distinguished Reviewer of the IEEE Transactions on EMC for the year 2019, *IEEE T-EMC*, 2020
- Google Faculty Research Award, *Google*, 2020
- APEMC Young Scientist Award, *Joint IEEE International Symposium on EMC & Asia-Pacific Symposium on EMC*, 2018

Awards received by advised students

- Outstanding Graduate Student Award, received by Yifan Ding, *IEEE St. Louis Section*, 2024
- IEEE EMC Society President’s Memorial Award, received by Shengxuan Xia, *IEEE EMC Society*, 2023
- Outstanding Graduate Student Award, received by Shengxuan Xia, *IEEE St. Louis Section*, 2022
- IEEE James C. Klouda Memorial Scholarship Award, received by Anfeng Huang, *IEEE EMC Society*, 2021
- IEEE James C. Klouda Memorial Scholarship Award, received by Yin Sun, *IEEE EMC Society*, 2020
- Student Hardware Design Contest 1st place, received by Omid Hoseini Izadi, *IEEE Int. Symp. EMC&SIPI*, 2020

Advising & Mentoring

▪ **Graduated Advisees: 11 Ph.D., 8 M.S.**

Ph.D.: Xiangrui Su (2024), Yifan Ding (2024), Junho Joo (2024), Shengxuan Xia (2023), Muqi Ouyang (2022), Ruijie He (2022), Anfeng Huang (2021), Jiayi He (2021), Ling Zhang (2021), Yin Sun (2020), Omid Hoseini Izadi (2020)

M.S.: Kalkidan Woldemariam (2023), Jack Juang (2022), Tanner Fokkens (2022), Xin Fang (2022), Woncheol Song (2021), Shun Liu (2021), Yang Zhong (2019), Harsh Shrivastav (2019)

▪ **Current Graduate Students: 6 Ph.D., 3 M.S.**

Ph.D.: Jiahuan Huang, Hanyu Zhang, Haran Manoharan, Wenchang Wang, Faye Squires, Davit Kharshiladze

M.S.: Jongsuk Hyun, Hariharan Prabakar, Lily Qiu

- **Undergraduate Research:** Peyton Odum (2024), Suho Lee (2024-2025), Drew Missler (2023), Marshall Haynes (2023-2025), Pablo Espindola Chavarria (2023), Alec Fitzmaurice (2023), Sumin Hwang (2022-2024), Mark Mitchell (2022-

2023), Nicolas Spears (2019), Jack Juang (2019), William Ong (2019)

- **Postdoctoral Fellows:** Dr. Mehdi Masoumabad (Dec. 2024 – present), Dr. Hyunwook Park (Jun. 2023 – present), Dr. Reza Yazdani (Jan. 2022 – Aug. 2024), Dr. Seungtaek Jeong (Apr. 2021 – Nov. 2022), Dr. Taelim Song (Jan. 2020 – Nov. 2021), Dr. Zhifei Xu (July 2020 – Dec. 2020)
- **Visiting Scholars:** Sanguk Lee (Jan. 2025 – June 2025), Davit Kharshiladze (Oct. 2024 – Jan. 2025), Lalit Kumar Baghel (Nov 2023 – June 2024), Seunghun Ryu (Mar. 2022 – Sep. 2022), Dr. Jonghwa Kwon (Sep. 2021 – Aug. 2022), Jaesik Moon (July 2021 – Aug. 2021), Yutao Tang (Oct. 2019 – Oct. 2020), Dr. Jongjoo Lee (Apr. 2019 – Feb. 2020), Cheolhan Kim (Aug. 2018 – Aug. 2019), Youngmin Ku (Jan. 2018 – Jan. 2019)

▪ **Ph.D. Thesis Titles:**

Xiangrui Su: Measurement Method and Applications of Transfer Function in RF Desensitization Problem

Yifan Ding: Power Supply Induced Jitter Analysis in High-speed Drivers

Junho Joo: Modeling and Analysis of DC-DC Converters for Power Distribution Networks Design

Shengxuan Xia: Non-linearity Modeling and Quantifications for Practical RF Interference Control

Muqi Ouyang: Accuracy Improvement of Cable Harness Modeling & Analytical Modeling of Multi-Reflections in High-Speed Signal Channels

Ruijie He: Modeling Methods for EMI Filter and Flyback Transformer

Anfeng Huang: Characterizing and Modeling Methods for Power Converters

Jiayi He: Machine Learning Based Modeling Techniques in EMC/SI and EMI Characterization for Power Supplies

Ling Zhang: PDN Modeling for High-Speed Multilayer PCB Boards and Decap Optimization Using Machine Learning Techniques

Omid Hoseini Izadi: Investigating the Effect of Operating Condition on ESD-induced Soft Failures

Yin Sun: Analysis and Characterization of Power Supply Induced Jitter (PSIJ) for High-speed Driver

Sponsored Research

Expenditures: ~ \$800k per year

Contracts over the last 8 years:

Sponsor	Project title	Awarded	Period	PI or Co-PI	% of shared credit
NSF	S-STEM: APEX: An Accelerated Pipeline to Graduate Excellence in Electrical and Computer Engineering	\$1,499,991	10/01/2022 – 9/30/2028	CPI	10%
Meta	Center for EMC Membership – Meta PIM	\$70,000/year	10/01/2024 – Present	PI	50%
Clear Signal Solution	CEMC –Associate Membership	\$35,000/year	01/01/2023 – Present	PI	60%
Meta	Center for EMC Membership – Meta RFI	\$70,000/year	12/08/2022 – Present	PI	60%
Google	Center for EMC Membership – Google PI	\$70,000/year	8/29/2022 – Present	PI	60%
Amazon,	Center for EMC Membership	\$70,000/year	05/20/2021 – Present	PI	60%
Cisco	Center for EMC Membership – Cisco PDN	\$70,000/year	11/01/2021 – Present	PI	60%
Google	Behavior Modeling of Multi-Phase Buck Converters	\$240,000	06/09/2023 –06/08/2025	PI	100%
KAIST	Research on 5I to improve the performance and reliability of semiconductors, packages, and modules	\$180,000	07/01/2022 –06/30/2025	PI	100%
Samsung	Coupling Path Simulation and Analysis for ESD Failures due to Radiated Noise	\$140,000	01/01/2024 –12/31/2024	PI	100%
NSF	Phase III I/UCRC Missouri S&T: Center for Electromagnetic Compatibility	\$500,000	12/15/2019 –12/14/2024	CPI	33%
ESDEMC	CEMC –Associate Membership	\$35,000	08/14/2023 – 8/13/2024	PI	60%

Meta	Center for EMC Membership – Meta PIM	\$80,000	02/01/2023 – 1/31/2024	PI	50%
US Dept. of Education	GAANN-Doctoral Research and Training in Cybersecurity through Electromagnetic Compatibility	\$608,760	10/01/2021 –09/30/2024	CPI	21%
Google	Center for EMC Membership - Google RFI	\$80,000	9/17/2023 – 9/16/2024	PI	50%
IBM	Center for EMC Membership	\$210,000	04/01/2020 – 3/31/2024	PI	60%
Asustek Computer	Center for EMC Membership	\$490,000	02/01/2017 – 1/31/2024	PI	60%
Apple Computer	Center for EMC Membership	\$210,000	09/28/2020 – 9/27/2023	PI	60%
SK Hynix	Radiated Emission Improvement through EMI Source Modeling	\$70,000	09/01/2022 –08/31/2023	PI	100%
Google	Studying Cellphone Tx Desense due to Loose Metal Contact	\$260,000	3/18/2021 – 4/04/2023	PI	65%
Kemet	CEMC – Associate Membership	\$105,000	04/02/2020 – 4/01/2023	PI	60%
Sony	Center for EMC Membership	\$420,000	04/01/2017 – 3/31/2023	PI	60%
Google	Establishing a Parameterized Model of PMICs	\$120,000	11/17/2021 –11/16/2022	PI	100%
Samsung	Center for EMC Membership - Mobile	\$70,000	03/12/2021 –3/11/2022	PI	50%
NSF	EAGER: SARE: Security and Functionality of Energy Storage Devices from an External Electromagnetic Attack	\$300,000	09/01/2020 –08/31/2022	CPI	50%
Hyundai Mobis	Chamber-less Radiated Emission Estimation	\$70,000	11/10/2020 –11/09/2021	PI	100%
Google	Center for EMC Membership	\$70,000	11/01/2020 – 10/31/2021	PI	50%
US Dept. of Education	GAANN-A Doctoral Program on Data-Enabled Assurance of Electromagnetic Compatibility	\$597,000	10/01/2018 –09/30/2021	CPI	10%
SK Hynix	Component-level Assessment Techniques for RF Desense	\$200,000	Gift	PI	100%
Google	Studying Cellphone Tx Desense due to Loose Metal Contact	\$110,000	3/18/2020 –3/17/2021	PI	100%
Deere and Company	Center for EMC Membership	\$280,000	03/24/2017 – 3/23/2021	PI	50%
Google Faculty Research Award	Machine Learning-Based Design of Power Distribution Networks	\$42,928	Gift	PI	100%
Boeing	Task 5 - Mission Optimized RF System Operation	\$20,000	09/02/2019 –12/30/2020	CPI	20%
Boeing	Task4 - 5G Wireless Integration Study/Analysis	\$20,000	09/02/2019 –12/30/2020	CPI	20%
Samsung	Center for EMC Membership - Mobile	\$70,000	04/15/2019 –04/14/2020	PI	50%
Juniper Networks	Center for EMC Membership	\$70,000	04/12/2019 –04/11/2020	PI	50%
Samsung	Center for EMC Membership - GTC	\$70,000	03/11/2019 –03/10/2020	PI	50%
Amazon	TV Noise Source Reconstruction	\$35,000	05/01/2019 –08/31/2019	CPI	40%
SK Hynix	System-level Power Supply Induced Jitter Optimization	\$70,000	Gift	PI	100%
Ford Motor Company	Assessment of IEMI Threats on Automobiles	\$70,000	Gift	PI	77%
NSF	Phase II I/UCRC Missouri S&T: Center for Electromagnetic Compatibility	\$166,680	09/25/2017 –07/31/2019	CPI	10%
Hyundai Motor Company	Defensive Technologies against Intentional EMI of Automotive	\$100,000	08/01/2018 –07/31/2019	PI	100%
Samsung Electronics	Numerical Method of Electromagnetic Interference in High-Speed Serial Link Systems	\$120,000	01/01/2018 –12/31/2018	PI	100%
Samsung	Center for EMC Membership - GTC	\$60,000	05/01/2017 –04/30/2018	PI	20%

Department and University Service

- S&T Undergraduate Research Conference Judge, 4/13/2023
- Faculty Search Committee for ECE Kummer Professor, 2022
- EE Undergraduate Studies/Curriculum Committee (department), 2020 ~ present
- Faculty Research Award Committee (university), 2020
- NTT EMC Assistant Research Professor Search Committee (department), 2019
- Faculty Search Committee for Assistant Professor in Electromagnetics Position (department), 2019
- S&T Undergraduate Research Conference Judge, 4/16/2019
- NTT EMC Associate Research Professor Search Committee (department), 2018
- Graduate Research Showcase (GRS) Judge, 04/10/ 2017

Patent

- [1] C. Hwang, Z. Xu, and J. Fan, “Inaudible Voice Command Injection”, U.S. patent, App. 17349268.
- [2] J. Park, M. Leu, and C. Hwang, “Thin Cavity Resonator by using Laser Foil Printing”, U.S. patent, App. 18/953,652, Nov. 2024

Tutorials and Lectures

- [1] “Power Integrity” *Global University in IEEE Symposium on EMC&SIPI*, Pheonix, AZ, 8/07/2024
- [2] “PCB Decoupling”, *Tutorial in IEEE Symposium on EMC&SIPI*, Pheonix, AZ, 8/05/2024
- [3] “PCB Decoupling”, *Tutorial in IEEE Symposium on EMC&SIPI*, Grand Rapid, MI, 7/31/2023
- [4] “RF Desense/EMI boot camp”, *Amazon Wireless Technology Group*, 8/15/2022-8/19/2022 (online)
- [5] “Power Integrity”, *C.P. Global University in IEEE Symposium on EMC&SIPI*, Spokane, WA, 8/03/2022
- [6] “Power Integrity”, *C.P. Global University in IEEE Symposium on EMC&SIPI*, Virtual Conference, 7/28/2021
- [7] “Power Integrity”, *C.P. Global University in IEEE Symposium on EMC&SIPI*, Virtual Conference, 7/29/2020
- [8] “Transmission Lines and Signal Integrity”, *C.P. Global University in IEEE Symposium on EMC&SIPI*, New Orleans, LA, 7/24/2019
- [9] “PCB Decoupling”, *Tutorial in IEEE Symposium on EMC&SIPI*, New Orleans, LA, 7/22/2019
- [10] “Statistical Analysis of HBM Channel Performance”, *Tutorial in IEEE EDAPS Symposium*, Chandigarh, India, 12/16/2018

Invited Presentations

- [1] “ML Assisted PDN Designs” *Silicon Valley Area Workshop on EMC*, Milpitas, CA, 11/22/2024.
- [2] “ML assisted PI solutions”, *Samsung Electronics Workshop on Electromagnetics*, Suwon, Korea, 10/8/2024
- [3] “Reinforcement Learning for PDN Optimization”, *IEEE Symposium on EMC&SIPI*, Pheonix, AZ, 8/07/2024
- [4] “Inaudible Attack on Smark Speakers using IEMI”, *IEEE Symposium on EMC&SIPI*, Pheonix, AZ, 8/05/2024
- [5] “Machine Learning Applications in Hardware Design: SIPI Perspective” *Samsung Electronics*, Hwasung, Korea, 6/12/2024
- [6] “Machine Learning Applications in Hardware Design: SIPI Perspective” *KAIST*, Daejeon, Korea, 6/10/2024
- [7] “Machine Learning Applications in Hardware Design: SIPI Perspective” *IEEE Santa Clara Valley Chapter*, Fremont, CA, 1/29/2024
- [8] “Machine Learning Applications in Hardware Design: SIPI and EMI Perspective” *Amazon Wireless Summit* (online), 09/19/2023
- [9] “Modeling and Mitigation of RF Desensitization for Wireless Devices” *IIT Kharapur*, Kharagpur, India, 5/19/2023
- [10] “Machine Learning Applications in Hardware Design” *Google Tech Talk*, Mountain View, CA, 4/27/2023
- [11] “Modeling and Mitigation of RF Desensitization for Wireless Devices” *Worcester Polytechnic Institute* (online), 2/8/2023
- [12] “HSPice Compatible Non-linear VRM Model for PI Simulation”, *Microsoft Tech Talk* (online), 11/09/2022
- [13] “Minimizing Number of Decoupling Capacitors with Genetic Algorithm Optimization”, *Microsoft Tech Talk* (online), 10/07/2022
- [14] “An Analysis on the Effectiveness of 2 and 3 Terminal Capacitors in PDN Design”, *EDI CON Online* (webinar), 10/05/2022
- [15] “RF Interference Modeling and Mitigation in Wireless Devices”, *Asia-Pacific Symposium on EMC 2022*, Beijing, China, 09/01/2022
- [16] “Efficient I-EMI Simulation”, *Chungnam National University*, Deajeon, Korea, 07/19/2022

- [17] “Board-level Shielding Can Shielding Effectiveness Measurement and Set Correlation”, *KTL*, Seoul, Korea, 07/15/2022
- [18] “Machine Learning Based Source Reconstruction for EMI Modeling and Analysis”, *EMC Korea*, Seoul, Korea, 07/14/2022
- [19] “Latest Trends in EMC – Consumer/Automotive Industry”, *Amazon Wireless Summit 2022*, 6/7/2022 (webinar)
- [20] “Machine Learning based Decoupling Capacitor Placement Optimization”, *Samsung*, 10/12/2021 (webinar)
- [21] “Machine Learning Applications in EMI/PI”, *Samsung*, 7/7/2021 (webinar)
- [22] “Inaudible Command Injection to Voice-Controlled Devices using EMI”, *MUELAN tech talk*, 08/31/2020 (webinar)
- [23] “IC/package Radiation Mechanism for RF Desense Analysis”, *EMC Korea 2020*, Seoul, Korea, 07/21/2020 (webinar)
- [24] “RF Desense in Wireless Devices”, *Samsung*, Hwasung, Korea, 06/10/2019
- [25] “Threats of Intentional EMI and Hardware Security”, *Mando R&D Center*, Pangyo, Korea, 5/31/2019
- [26] “Threats of Intentional EMI and Hardware Security”, *Samsung*, Suwon, Korea, 5/30/2019
- [27] “D-dot sensor and Intentional EMI”, *National Security Research Institute*, Daejeon, Korea, 5/28/2019
- [28] “RF/Digital Integration in IoT Devices”, *Sungkyunkwan University*, Suwon, Korea, 5/23/2019
- [29] “D-dot sensor and Intentional EMI”, *Replex*, Seoul, Korea, 5/22/2019
- [30] “RF Desense in Wireless Devices”, *KAIST*, Daejeon, Korea, 12/21/2018
- [31] “Exploration of Machine Learning in EMC Applications”, *Aju University*, Suwon, Korea, 12/20/2018
- [32] “Coupling Path Visualization Technique”, *EMC Workshop in Samsung Electronics*, Suwon, Korea, 12/19/2018
- [33] “Research in Electromagnetic Compatibility”, *IEEE Emphasis Area Workshop, Missouri S&T*, 11/14/2018
- [34] “Analysis and Modeling of RF Desense in Mobile Devices”, *Google*, Mountain View, CA, 08/27/2018
- [35] “PAM-4 Signaling Fundamentals and Challenges”, *Samsung EMC Conference 2018*, Yongin, Korea, 08/14/2018
- [36] “High-speed Channel Design for RF desense”, *Samsung EMC Conference 2018*, Yongin, Korea, 08/14/2018
- [37] “Fast and Accurate RFI Analysis for Wireless Devices”, *Samsung Electronics*, Hwasung, Korea, 08/13/2018
- [38] “Power Integrity Concepts for High-Speed Design on Multi-Layer PCBs”, *Workshop in IEEE Symposium on EMC*, Long Beach, CA, 08/03/2018
- [39] “Fast and Accurate RFI Analysis for Wireless Devices”, *Sungkyunkwan University*, Suwon, Korea, 12/22/2017
- [40] “Fast and Accurate RFI Analysis for Wireless Devices”, *Yonsei University*, Seoul, Korea, 12/21/2017
- [41] “Fast and Accurate RFI Analysis for Wireless Devices”, *Workshop in Samsung Electronics*, Suwon, Korea, 12/19/2017
- [42] “Source Reconstruction and RFI Estimation”, *Amazon*, CA, 10/16/2017
- [43] “Analysis and Modeling of RF Desensitization in Mobile Devices”, *UNIST*, Ulsan, Korea, 07/04/2017
- [44] “System Level Approach for RF Desensitization”, *ETRI*, Daejeon, Korea, 06/30/2017
- [45] “Mechanism and Modeling of Noise Source and Coupling for RF Desensitization”, *Samsung Electronics*, Hwasung, Korea, 06/28/2017
- [46] “Analysis and Modeling of RF Desensitization in Mobile Devices”, *Kwangwoon Univ.*, Seoul, Korea, 06/23/2017
- [47] “Mechanism and Modeling of Noise Source and Coupling for RF Desensitization”, *EMC Workshop in Samsung Electronics*, Suwon, Korea, 06/19/2017
- [48] “Analysis and Modeling of RF Desensitization in Mobile Devices” *UESTC*, Chengdu, China, 06/15/2017

Publications

▪ Book/Chapters

- [1] C. Hwang, “RF Desensitization in Wireless Devices”, in *RF Systems, Circuits, and Components*, editor Xi Sung Loo, Intech, ISBN 978-953-51-6250-6, Nov. 2018.
- [2] C. Hwang, J. Kim, J. Fan, J. Kim, and J. L. Drewniak, “Modeling of On-Chip Power Distribution Network”, in *Noise Coupling in System-on-Chip*, editor Thomas Noulis, CRC Press, ISBN 9781498796774, Dec. 2017, Chapter 5, pp. 93 -138.

▪ Magazine

- [1] C. Hwang and J. Fan, “Modeling and Mitigation of Radio Frequency Interference for Wireless Devices” *IEEE EMC Magazine*, vol. 12, no.1, pp.87-92, May 2023
- [2] C. Hwang, “Mitigating Self-generated EMI for Wireless Devices”, *The Bridge*, vol. 118, no. 2, pp. 24-28, May 2022

▪ Refereed Journal Articles

- [1] X. Su², W. Huang², J. Cho, J. Paek, and C. Hwang¹, “A Method for Measuring the Transfer Function Inside a Compact Metallic Enclosure Using a Slot Antenna” *IEEE Trans. on Electromagnetic Compatibility*, early access.
- [2] Y. Ding², J. Zhang, M.-F. Xue, X. Hua, B. Leung, E. A. MacIntosh, and C. Hwang¹, “Multi-Layer Ceramic Capacitor Source Model Application in Acoustic Noise Prediction” *IEEE Trans. on Signal and Power Integrity*, vol. 4, pp. 19-23, 2025.
- [3] H. Park⁴, Y. Ding², L. Zhang², N. Bondarenko, H. Ye, B. Achkir, and C. Hwang¹, “High-speed Channel Transformer (HSCT): A Scalable Transformer Network-based Signal Integrity (SI) Simulator” *IEEE Trans. on Electromagnetic Compatibility*, vol. 66, no. 6, pp.1977-1987, Dec. 2024.
- [4] J. Juang², L. Zhang², F. D. Paulis, and C. Hwang¹, “Improved Genetic Algorithm for Minimizing the Number of Decoupling Capacitors Through Augmented Population Generation” *IEEE Trans. on Signal and Power Integrity*, pp. 186-198, 2024.
- [5] S. Jeong⁴, J. Kwon, D. Pai, J. Rajagopalan, and C. Hwang¹, “Visualization of Noise Coupling Paths based on Reciprocity Theorem” *IEEE Trans. on Electromagnetic Compatibility*, vol. 66, no. 5, pp. 1505-1514, Oct. 2024.
- [6] L. Jiang, L. Zhang, S. Tan, D. Li, C. Hwang¹, J. Fan, E.-P. Li, “A Novel Physics-Assisted Genetic Algorithm (PAGA) for Decoupling Capacitor Optimization” *IEEE Trans. on Microwave Theory and Techniques*, vol. 72, no. 8, pp. 4498-4507, Aug. 2024.
- [7] J. Joo², D. Commerou, H. Huang, C. Y. Yeh, H. Lin, B. C. Tseng, and C. Hwang¹, “Modeling of a Voltage Regulator Module for Power Integrity: Power-Supply-Induced Jitter” *IEEE Trans. on Signal and Power Integrity*, vol. 3, pp. 110-125, June 2024.
- [8] Y. Ding², M.-F. Xue, J. Zhang, X. Hua, B. Leung, E. A. MacIntosh, and C. Hwang¹, “Multilayer Ceramic Capacitor Vibration Source Model Library Development” *IEEE Trans. on Electromagnetic Compatibility*, vol. 66, no. 4, pp. 1232-1242, May 2024.
- [9] Y. Ding², M.-F. Xue, J. Zhang, X. Hua, B. Leung, E. A. MacIntosh, and C. Hwang¹, “Equivalent Source Investigation for the PCB Vibration Excited by Multilayer Ceramic Capacitor” *IEEE Trans. on Electromagnetic Compatibility*, vol. 66, no. 4, pp. 1290-1294, March 2024.
- [10] Y. Ding², J. Zhang, M. Xue, X. Hua, B. Leung, E. MacIntosh, and C. Hwang¹, “Equivalent Force Extraction Methodology for Electrical Component Induced PCB Vibration”, *IEEE Trans. on Electromagnetic Compatibility*, vol. 66, No. 1, pp. 270-280, Feb. 2024.
- [11] Y. Ding², Y. Sun², R. Wolff, Z. Yang, and C. Hwang¹, “IBIS Model Simulation Accuracy Improvement by Including Power Supply Induced Jitter Effect” *IEEE Trans. on Signal and Power Integrity*, vol. 3, pp. 21-29, Jan. 2024.
- [12] J. Joo², H. Zhang², H. Wang, Z. Liang, L. Cao, J. S. Rentmeister, and C. Hwang¹, “Method for Transient Behavior Modeling of a Multiphase Voltage Regulator Module for End-to-End Power Integrity Simulation,” *IEEE Trans. on Signal and Power Integrity.*, vol. 2, pp. 122-133, 2023.
- [13] X. Wang², M. Wu, J. Rajagopalan, A. Mohan, D. Kim⁴, and C. Hwang¹, “Investigation of the Radiation Mechanism of Heatsinks based on Characteristic Mode Theory”, *IEEE Trans. on Electromagnetic Compatibility*, vol. 65, no. 5, pp. 1446-1454, Oct. 2023.
- [14] L. Zhang², L. Jiang, J. Juang², Z. Yang, E.-P. Li, and C. Hwang¹, “Decoupling Optimization for Complex PDN Structures Using Deep Reinforcement Learning” *IEEE Trans. on Microwave Theory and Techniques*, vol. 71, no. 9, pp. 1557-9670, Sep. 2023.
- [15] S. Xia², H. Wang², Y. Wang, Z. Wu, C. Hwang, and J. Fan^{1,4}, “Dipole Moment Based Reciprocity for Practical Desensitization Identification and Mitigation” *IEEE Trans. on Electromagnetic Compatibility*, vol. 65, no. 4, pp. 1017-1026, Aug. 2023.
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