

# ARIF EGE ENGIN

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## EDUCATION

- 07/2001–08/2004 PhD (Summa Cum Laude) in Electrical and Electronics Engineering at the University of Hannover, Germany. Date of defense: 26 August 2004.  
*Thesis: Modeling of Lossy Interconnects and Packages with Non-Ideal Power/Ground Planes*
- 10/1998–05/2001 MS in Electrical and Electronics Engineering at the University of Paderborn, Germany  
*Thesis: Dyadic Green's Function for Stratified Media Using Complex Images*
- 09/1993–06/1998 BS in Electrical and Electronics Engineering at the Middle East Technical University, Ankara, Turkey
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## EMPLOYMENT

- 08/2019–present Professor  
Department of Electrical & Computer Engineering  
San Diego State University (SDSU), San Diego CA, USA
- 08/2013–07/2019 Associate Professor, SDSU
- 08/2008–07/2013 Assistant Professor, SDSU
- 01/2005–08/2008 Assistant Research Director, Packaging Research Center,  
School of Electrical and Computer Engineering,  
Georgia Institute of Technology, Atlanta GA, USA
- 07/2001–12/2004 Research Engineer, Fraunhofer Institute for Reliability and Microintegration, Berlin, Germany

01/1999–06/2001 Research Assistant, Siemens C-Lab, Fraunhofer Institute for Reliability and Microintegration, Paderborn, Germany (part-time)

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## RESEARCH VISITS ABROAD

12/01/2015–07/31/2016 Humboldt Research Fellowship for experienced Researchers at Fraunhofer IZM, Germany

06/01/2017–08/31/2017 Humboldt Research Fellowship for experienced Researchers at Fraunhofer IZM, Germany

06/01/2018–08/31/2018 Humboldt Research Fellowship for experienced Researchers at Fraunhofer IZM, Germany

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## GRANTS

09/2014-08/2019 NSF, "Determination of High-Frequency Properties of Integrated Circuit Packages," (\$291K, PI).

11/2016-10/2017 Sumitomo, Japan "Stepped Impedance Common-Mode Filter in Differential Lines," (\$25K, PI).

12/2015 Alexander-von-Humboldt Research Fellowship, "Gigahertz Power Distribution Network Design," (\$69K, PI).

08/2015 Gift from Oak Mitsui Corporation, "Impact of Surface Roughness of Return Planes on Signal Integrity," (\$10K, PI).

10/2011-03/2013 NEC Corporation, Japan "Efficient Simulation Methodology for Complex Power Delivery Networks," (\$80K, PI).

01/2014 Gift from Kyocera America, "Dielectric Constant and Loss Tangent Characterization of Ceramic Packaging," (\$1K, PI).

06/2013 Gift from Oak Mitsui Corporation, "Improved Signal Integrity Using Thin Dielectrics between Power and Ground Planes," (\$5K, PI).

07/2013-12/2013 Summer Visiting Faculty at U.S. Air Force Rome Research Laboratory/Information Institute (AFRL), "Electrical Design for Very-Large Scale 3D Integrated Systems," (\$25K, PI).

07/2012-12/2012 Summer Visiting Faculty at AFRL, "Electrical Model Extraction for Interconnects in 3D ICs," (\$23K, PI).

- 06/2011-12/2011 Summer Visiting Faculty at AFRL, "3D IC Test Vehicle Design for Testing of RF Properties of Through Silicon Vias," (\$23K, PI).
- 06/2017 - 08/2017 SDSU Summer Undergraduate Research Program: "High-Frequency Characterization of Flip-Chip Packages," (\$3K, PI).
- 01/2014-06/2015 SDSU University Grants Program (UGP), "High-Frequency Chip Package Characterization," (\$9K, PI).
- 01/2012-06/2013 SDSU UGP, "Electrical Design, Modeling, and Simulation of 3D Integrated Circuits," (\$10K, PI).
- 01/2010-06/2011 SDSU UGP, "Analysis and Characterization of Ultra-High-Speed Interconnects," (\$10K, PI).
- 03/2013-03/2014 California Energy Commission, "Electroporation of Algal Biomass to Enhance Methane Gas Production," (Co-PI).
- 2005-2007 Co-PI at Georgia Institute of Technology in Research Contract from Panasonic, "Panswitch-Customized Simultaneous Switching Noise Simulator", (\$250K, Co-PI).

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## AWARDS

- 12/2017 IEEE EMC Society Motohisa Kanda Award for the most cited paper in the last 5 years (2013-2017)
- 10/2016 Best Paper of the Session Award in International Symposium on Microelectronics, Pasadena, CA
- 12/2015 Humboldt Research Fellow
- 10/2015 Outstanding Educator Award from the International Microelectronics Packaging and Assembly Society
- 09/2009 Best Paper of the Session Award in Advanced Technology Workshop on RF and Microwave Packaging, San Diego, CA
- 03/2009 GRC/FCRP/NRI Inventor Recognition Award by Semiconductor Research Corporation
- 11/2007 Best Paper of the Session Award in International Symposium on Microelectronics, San Jose, CA
- 02/2007 Best Paper Award Finalist in Board-Level Design Category, DesignCon, Santa Clara, CA
- 05/2006 Outstanding Poster Paper Award, ECTC, San Diego, CA

11/2005	Packaging Research Center (PRC) Award for the fastest start and program management in PRC, Georgia Institute of Technology, Atlanta, GA
08/2004	Summa Cum Laude from the University of Hannover, Germany
05/2001	Dean's Award 2001 from the University of Paderborn, Germany

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## PUBLICATIONS

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### BOOKS

Madhavan Swaminathan and A. Ege Engin, *Power Integrity Modeling and Design for Semiconductors and Systems*, Prentice Hall, November, 2007, ISBN: 0-13-615206-6.

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### BOOK CHAPTERS

Madhavan Swaminathan, A. Ege Engin, Vinu Govind, Sidharth Dalmia, and Amit Bavisi, *Chapter 4: Mixed Signal Design, in Introduction to System-on-Package (SOP) - Edited by Rao R. Tummala and Madhavan Swaminathan*, McGraw-Hill, March 2008, ISBN: 0071459065.

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### REFEREED JOURNALS

- [1] A. Ma and A. E. Engin, "Orthogonal rational approximation of transfer functions for high-frequency circuits," *International Journal of Circuit Theory and Applications*, 2022. [Online]. Available: <https://onlinelibrary.wiley.com/doi/abs/10.1002/cta.3488>
- [2] A. E. Engin, "Passive scalar function approximation using sos polynomials," *IEEE Transactions on Electromagnetic Compatibility*, pp. 1–6, 2022.
- [3] A. Valera-Rivera and A. E. Engin, "Aaa algorithm for rational transfer function approximation with stable poles," *IEEE Letters on Electromagnetic Compatibility Practice and Applications*, vol. 3, no. 3, pp. 92–95, 2021.
- [4] R. B. Paul, A. E. Engin, and J. Aguirre, "Dielectric and underfill characterization using cavity resonators for millimeter-wave applications," *IEEE Letters on Electromagnetic Compatibility Practice and Applications*, pp. 1–1, 2020.

- [5] W. A. Alarcon, A. E. Engin, I. Ndip, and K. Lang, “Ebg common-mode filter design using uncoupled coplanar waveguide to microstrip transitions,” *IEEE Letters on Electromagnetic Compatibility Practice and Applications*, pp. 1–1, 2020.
- [6] A. E. Engin, I. Ndip, K. Lang, and G. Aguirre, “Mixed-port scattering and hybrid parameters for high-speed differential lines,” *IEEE Transactions on Electromagnetic Compatibility*, vol. 61, no. 4, pp. 1175–1182, Aug 2019.
- [7] A. E. Engin, N. Modi, and H. Oomori, “Stepped-impedance common-mode filter for differential lines enhanced with resonant planes,” *IEEE Transactions on Electromagnetic Compatibility*, pp. 1–8, 2018.
- [8] A. E. Engin, I. Ndip, K. Lang, and J. Aguirre, “Closed-form multipole debye model for time-domain modeling of lossy dielectrics,” *IEEE Transactions on Electromagnetic Compatibility*, vol. 61, no. 3, pp. 966–968, June 2019.
- [9] A. E. Engin, I. Ndip, K. D. Lang, and G. Aguirre, “Nonoverlapping power/ground planes for suppression of power plane noise,” *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 8, no. 1, pp. 50–56, Jan 2018.
- [10] —, “Power plane filter using higher order virtual ground fence,” *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 7, no. 4, pp. 519–525, April 2017.
- [11] A. E. Engin, C. Fergusson, Q. F. Su, and J. Aguirre, “Power archipelago for filtering power plane noise,” *IEEE Transactions on Electromagnetic Compatibility*, vol. 58, no. 5, pp. 1602–1608, Oct 2016.
- [12] A. Engin, “Passive multiport rc model extraction for through silicon via interconnects in 3-d ics,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 56, no. 3, pp. 646–652, June 2014.
- [13] B. Curran, I. Ndip, E. Engin, J. Bauer, H. Pötter, K.-D. Lang, and H. Reichl, “A modeling approach for predicting the effects of dielectric moisture absorption on the electrical performance of passive structures,” *Journal of Microelectronics and Electronic Packaging*, vol. 11, no. 3, pp. 115–121, 2014. [Online]. Available: <http://dx.doi.org/10.4071/imaps.421>
- [14] A. Engin and J. Bowman, “Virtual ground fence for GHz power filtering on printed circuit boards,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 55, no. 6, pp. 1277–1283, 2013.
- [15] A. Engin and S. Narasimhan, “Modeling of crosstalk in through silicon vias,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 55, no. 1, pp. 149–158, 2013.

- [16] A. E. Engin and P. Pasunoori, “Automated complex permittivity characterization of ceramic substrates considering surface-roughness loss,” *Journal of Microelectronics and Electronic Packaging*, vol. 9, pp. 144–148, 2012.
- [17] F. Ohnimus, G. Fotheringham, I. Ndip, A. Engin, S. Guttowski, H. Reichl, and K.-D. Lang, “Integration of planar antennas considering electromagnetic interactions at board level,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 53, no. 4, pp. 1005–1014, nov. 2011.
- [18] Y. Zhang, X. Hu, A. Deutsch, A. Ege Engin, J. Buckwalter, and C.-K. Cheng, “Prediction and comparison of high-performance on-chip global interconnection,” *Very Large Scale Integration (VLSI) Systems, IEEE Transactions on*, vol. 19, no. 7, pp. 1154–1166, July 2011.
- [19] A. Engin, “An arnoldi algorithm for power-delivery networks with variable dielectric constant and loss tangent,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 52, no. 4, pp. 859–865, nov. 2010.
- [20] A. E. Engin, “Extraction of dielectric constant and loss tangent using new rapid plane solver and analytical debye modeling for printed circuit boards,” *Microwave Theory and Techniques, IEEE Transactions on*, vol. 58, no. 1, pp. 211–219, Jan. 2010.
- [21] A. Engin, “Efficient sensitivity calculations for optimization of power delivery network impedance,” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 52, no. 2, pp. 332–339, may 2010.
- [22] K. Srinivasan, P. Yadav, A. Engin, M. Swaminathan, and M. Ha, “Fast EM/circuit transient simulation using Laguerre equivalent circuit (SLeEC),” *Electromagnetic Compatibility, IEEE Transactions on*, vol. 51, no. 3, pp. 756–762, Aug. 2009.
- [23] T. H. Kim, M. Swaminathan, A. Engin, and B. Yang, “Electromagnetic band gap synthesis using genetic algorithms for mixed signal applications,” *Advanced Packaging, IEEE Transactions on*, vol. 32, no. 1, pp. 13–25, Feb. 2009.
- [24] S. N. Lalgudi, E. Engin, G. Casinovi, and M. Swaminathan, “Accurate transient simulation of interconnects characterized by band-limited data with propagation delay enforcement in a modified nodal analysis framework,” *IEEE Transactions on Electromagnetic Compatibility*, vol. 50, no. 3, pp. 715–729, Aug. 2008.
- [25] P. Muthana, K. Srinivasan, A. E. Engin, M. Swaminathan, R. Tummala, V. Sundaram, B. Wiedenman, D. Amey, K. Dietz, and S. Banerji, “Improvements in noise suppression for I/O circuits using embedded planar capacitors,” *IEEE Transactions on Advanced Packaging*, vol. 31, no. 2, pp. 234–245, May 2008.

- [26] P. Muthana, A. E. Engin, M. Swaminathan, R. Tummala, V. Sundaram, B. Wiedenman, D. Amey, K. Dietz, and S. Banerji, “Design, modeling and characterization of embedded capacitor networks for core decoupling in the package,” *IEEE Transactions on Advanced Packaging*, vol. 30, no. 4, pp. 809–822, Nov. 2007.
- [27] R. Mandrekar, K. Srinivasan, E. Engin, and M. Swaminathan, “Causality enforcement in transient co-simulation of signal and power delivery networks,” *IEEE Transactions on Advanced Packaging*, vol. 30, no. 2, pp. 270–278, May 2007.
- [28] A. E. Engin, K. Bharath, and M. Swaminathan, “Multilayered finite-difference method (M-FDM) for modeling of package and printed circuit board planes,” *IEEE Transactions on Electromagnetic Compatibility*, vol. 49, no. 2, pp. 441–447, May 2007.
- [29] Y. Toyota, A. E. Engin, M. Swaminathan, K. Iokibe, and R. Koga, “Miniaturization of planar EBG structure formed in power/ground plane of printed circuit board to suppress EMI and electromagnetic noise (in Japanese),” *IEICE Transactions on Communications*, vol. J90-B, no. 11, pp. 1135–1142, Nov. 2007.
- [30] Y. Toyota, A. E. Engin, T. H. Kim, and M. Swaminathan, “Stopband analysis using dispersion diagram for two-dimensional electromagnetic bandgap structures in printed circuit boards,” *IEEE Microwave and Wireless Components Letters*, vol. 16, no. 12, pp. 645–647, Dec. 2006.
- [31] A. E. Engin, W. John, G. Sommer, W. Mathis, and H. Reichl, “Modeling of striplines between a power and a ground plane,” *IEEE Transactions on Advanced Packaging*, vol. 29, no. 3, pp. 415–426, Aug. 2006.
- [32] A. E. Engin, W. Mathis, W. John, G. Sommer, and H. Reichl, “Closed-form network representations of frequency-dependent RLGC parameters,” *International Journal of Circuit Theory and Applications*, vol. 33, pp. 463–485, Nov. 2005.

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## REFEREED CONFERENCES

- [1] F. Coronado and A. E. Engin, “Passive modeling of interconnects using sum of squares partial fraction expansions,” in *2022 IEEE Electrical Design of Advanced Packaging and Systems (EDAPS)*, 2022, pp. 1–3.
- [2] —, “Sum of squares partial fractions: Application in modeling of interconnects in heterogeneous integration,” in *2022 IEEE ICSJ*, 2022, pp. 1–3.

- [3] —, “Passive modeling of one-port networks through sos orthogonal rational functions,” in *2022 IEEE 26th Workshop on Signal and Power Integrity (SPI)*, 2022, pp. 1–4.
- [4] A. Ma, D. Deaton, and A. E. Engin, “Stabilized sanathanan-koerner iteration for rational transfer function approximation of scattering parameters,” in *IMAPS*, Oct 2021.
- [5] R. B. Paul, A. E. Engin, and J. Aguirre, “Flip-chip underfill rf characterization,” in *IMAPS*, Oct 2019.
- [6] A. E. Engin, I. Ndip, and K. D. Lang, “Mixed-mode hybrid parameters for high-speed differential lines,” in *IMAPS*, Oct 2018.
- [7] A. E. Engin, I. Ndip, K. D. Lang, and J. Aguirre, “Differential-line characterization using mixed-port scattering parameters,” in *IEEE NEMO*, Aug 2018.
- [8] A. E. Engin, J. Aguirre, J. Walker, and E. Graddy, “Dielectric thickness, constant, and loss tangent characterization of ceramic substrates,” in *IMAPS CICMT*, Mar 2017.
- [9] N. P. Modi, A. Olivera, A. E. Engin, and H. Oomori, “Resonant-plane common-mode filter in differential lines,” in *2017 IEEE CPMT Symposium Japan (ICSJ)*, Nov 2017, pp. 235–238.
- [10] A. E. Engin, I. Ndip, K. D. Lang, and J. Aguirre, “Non-overlapping power/ground planes for localized power distribution network design,” in *2016 IEEE Electrical Design of Advanced Packaging and Systems (EDAPS)*, Dec 2016, pp. 7–9.
- [11] A. E. Engin, I. Ndip, K. D. Lang, and G. Aguirre, “Determination of dielectric thickness, constant, and loss tangent from cavity resonators,” in *IEEE EPTC*, Nov 2016.
- [12] A. E. Engin, I. Ndip, and K. D. Lang, “Higher-order virtual ground fence design for filtering power plane noise,” in *2016 IEEE 20th Workshop on Signal and Power Integrity (SPI)*, May 2016, pp. 1–3.
- [13] A. E. Engin, “Stepped-impedance common-mode filter in differential lines,” in *2016 IEEE CPMT Symposium Japan (ICSJ)*, Nov 2016, pp. 209–212.
- [14] Q. S. Su, A. E. Engin, and J. Aguirre, “Electrical characterization of low-profile copper foil for reduced surface roughness loss,” in *IMAPS*, oct. 2016.
- [15] C. Ferguson and A. Engin, “Power archipelago for ghz power filtering on printed circuit boards,” in *Electromagnetic Compatibility and Signal Integrity, 2015 IEEE Symposium on*, March 2015, pp. 193–196.



- [16] A. Ege Engin and J. Bowman, "Virtual ground fence options for shielding power plane noise," in *Electromagnetic Compatibility (EMC), 2014 IEEE International Symposium on*, Aug 2014, pp. 460–464.
- [17] A. E. Engin and E. Kozachenko, "Generalized debye model for pcb dielectrics and conductors," in *EMC'14 Tokyo*, Tokyo, Japan, May 2014.
- [18] H. Dsilva and A. E. Engin, "Dielectric constant, loss tangent, and surface-roughness loss characterization of ceramic substrates," in *IMAPS/ACerS International Conference and Exhibition on Ceramic Interconnect and Ceramic Microsystems Technologies (CICMT)*, apr. 2014.
- [19] A. Engin, "Equivalent circuit model extraction for interconnects in 3d ics," in *Design Automation Conference (ASP-DAC), 2013 18th Asia and South Pacific*, 2013, pp. 1–6.
- [20] A. Engin, B. Adepu, M. Kusumoto, and T. Harada, "Macromodeling of complex power delivery networks for efficient transient simulation," in *CPMT Symposium Japan, 2012 2nd IEEE*, 2012, pp. 1–4.
- [21] A. Engin and J. Bowman, "Power distribution network design and characterization using virtual ground fence," in *Electronics Packaging Technology Conference (EPTC), 2012 IEEE 14th*, 2012, pp. 393–396.
- [22] S. Raghavan N. and A. E. Engin, "High frequency signal propagation in through silicon vias," in *IMAPS 45th International Symposium on Microelectronics*, sep. 2012.
- [23] J. Bowman and A. E. Engin, "Virtual ground fence: A simple method for protection against high frequency simultaneous switching noise," in *IMAPS 45th International Symposium on Microelectronics*, sep. 2012.
- [24] A. Engin and N. Raghavan, "Modeling of coupled tsvs in 3d ics," in *Electromagnetic Compatibility (EMC), 2012 IEEE International Symposium on*, aug. 2012, pp. 7–11.
- [25] J. Bowman and A. E. Engin, "Virtual ground fence for power filtering on ic packages and printed circuit boards," in *IMAPS Advanced Technology Workshop and Tabletop Exhibition on RF and Microwave Packaging*, feb 2012.
- [26] A. E. Engin and P. Pasunoori, "Automated complex permittivity characterization of ceramic substrates considering surface-roughness loss," *Journal of Microelectronics and Electronic Packaging*, vol. 9, pp. 144–148, 2012.
- [27] A. E. Engin and S. Raghavan N., "Metal semiconductor (MES) TSVs in 3D ICs: Electrical modeling and design," in *IEEE International 3D System Integration Conference (3DIC)*, Feb. 2012.

- [28] A. Engin and J. Bowman, "Virtual ground fence: A methodology for ghz power filtering on printed circuit boards," in *Electromagnetic Compatibility (APEMC), 2012 Asia-Pacific Symposium on*, may 2012, pp. 421–424.
- [29] A. E. Engin and S. Raghavan N., "Analytical modeling of coupled TSVs in 3D ICs," in *IMAPS System Packaging Workshop*, Nov. 2011.
- [30] P. Pasunoori and A. E. Engin, "Automated dielectric constant and loss tangent characterization using cavity resonators," in *Electromagnetic Compatibility, 2011. EMC 2011. IEEE International Symposium on*, aug. 2011.
- [31] F. Akinwale and A. E. Engin, "A novel approach to the measurement and characterization of losses due to surface roughness in high speed transmission lines," in *IMAPS/ACerS 5th International Conference and Exhibition on Ceramic Interconnect and Ceramic Microsystems Technologies (CICMT)*,, apr. 2011.
- [32] A. E. Engin, "Debye model fitting for time-domain modeling of lossy dielectrics," in *IMAPS 43rd International Symposium on Microelectronics*, nov. 2010.
- [33] W. Zhang, L. Zhang, A. Shayan, W. Yu, X. Hu, Z. Zhu, E. Engin, and C.-K. Cheng, "On-chip power network optimization with decoupling capacitors and controlled-esrs," in *Design Automation Conference (ASP-DAC), 2010 15th Asia and South Pacific*, jan. 2010, pp. 119–124.
- [34] P. Du, X. Hu, S.-H. Weng, A. Shayan, X. Chen, A. Ege Engin, and C.-K. Cheng, "Worst-case noise prediction with non-zero current transition times for early power distribution system verification," in *Quality Electronic Design (ISQED), 2010 11th International Symposium on*, mar. 2010, pp. 624–631.
- [35] F. Ohnimus, I. Ndip, E. Engin, S. Guttowski, and H. Reichl, "Comparison of electromagnetic field distribution in vicinity of patch and slot antennas," in *Antennas Propagation Conference, 2009. LAPC 2009. Loughborough*, nov. 2009, pp. 649–652.
- [36] A. Shayan, X. Hu, W. Zhang, C.-K. Cheng, A. Engin, X. Chen, and M. Popovich, "3d stacked power distribution considering substrate coupling," in *Computer Design, 2009. ICCD 2009. IEEE International Conference on*, oct. 2009, pp. 225–230.
- [37] F. Ohnimus, I. Ndip, E. Engin, S. Guttowski, and H. Reichl, "Study on shielding effectiveness of mushroom-type electromagnetic bandgap structures in close proximity to patch antennas," in *Antennas Propagation Conference, 2009. LAPC 2009. Loughborough*, nov. 2009, pp. 737–740.

- [38] A. E. Engin and I. Ndip, "Reduction of signal line to power plane coupling using controlled-return-current transmission lines," in *International Symposium on Microelectronics*, San Jose, CA, Nov. 2009.
- [39] A. E. Engin, "Extraction of dielectric constant and loss tangent of microwave substrates using full sheet resonance method," in *IMAPS Advanced Technology Workshop On RF And Microwave Packaging*, Sep. 2009.
- [40] Y. Zhang, X. Hu, A. Deutsch, A. E. Engin, J. F. Buckwalter, and C.-K. Cheng, "Prediction of high-performance on-chip global interconnection," in *SLIP '09: Proceedings of the 11th international workshop on System level interconnect prediction*. New York, NY, USA: ACM, 2009, pp. 61–68.
- [41] X. Hu, W. Zhao, P. Du, Y. Zhang, A. Shayan, C. Pan, A. E. Egin, and C.-K. Cheng, "On the bound of time-domain power supply noise based on frequency-domain target impedance," in *SLIP '09: Proceedings of the 11th international workshop on System level interconnect prediction*. New York, NY, USA: ACM, 2009, pp. 69–76.
- [42] W. Zhang, W. Yu, X. Hu, A. Shayan, A. E. Engin, and C.-K. Cheng, "Predicting the worst-case voltage violation in a 3d power network," in *SLIP '09: Proceedings of the 11th international workshop on System level interconnect prediction*. New York, NY, USA: ACM, 2009, pp. 93–98.
- [43] A. Kashi, N. Roy, E. Engin, and V. Devabhaktuni, "A new multi-dimensional rf and microwave modeling algorithm based on rational interpolants and hybrid mapping," in *Signal Integrity and High-Speed Interconnects, 2009. IMWS 2009. International Microwave Workshop Series on*, Feb. 2009, pp. 73–76.
- [44] A. Engin and M. Swaminathan, "Power transmission lines: A new interconnect design to eliminate simultaneous switching noise," *Electronic Components and Technology Conference, 2008. ECTC 2008. 58th*, pp. 1139–1143, May 2008.
- [45] A. E. Engin, A. Tambawala, M. Swaminathan, P. Pramanik, and K. Yamazaki, "Causal modeling and extraction of dielectric constant and loss tangent for thin dielectrics," in *IEEE International Symposium on Electromagnetic Compatibility*, Honolulu, HI, Jul. 2007.
- [46] A. E. Engin, A. Tambawala, M. Swaminathan, S. Bhattacharya, P. Pramanik, and K. Yamazaki, "Frequency-dependent dielectric constant and loss tangent characterization of thin dielectrics using a rapid solver," in *Proc. Electronic Components and Technology Conference*, Reno, NV, Jun. 2007.

- [47] A. E. Engin, K. Bharath, and M. Swaminathan, "Analysis for signal and power integrity using the multilayered finite difference method," in *ISCAS*, New Orleans, LA, May 2007.
- [48] A. E. Engin, Y. Toyota, T. H. Kim, and M. Swaminathan, "Analysis and design of electromagnetic bandgap (EBG) structures for power plane isolation using 2D dispersion diagrams and scalability," in *Proc. IEEE Workshop on Signal Propagation on Interconnects*, Germany, May 2006.
- [49] A. E. Engin, A. Tambawala, M. Swaminathan, S. Bhattacharya, P. Pramanik, and K. Yamazaki, "Dielectric constant and loss tangent characterization of thin high-K dielectrics using corner-to-corner plane probing," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 29–32.
- [50] A. E. Engin, K. Bharath, K. Srinivasan, and M. Swaminatha, "Modeling of multilayered packages and boards using modal decomposition and finite difference methods," in *IEEE International Symposium on Electromagnetic Compatibility*, Portland, OR, Aug. 2006.
- [51] A. E. Engin, M. Swaminathan, and Y. Toyota, "Finite difference modeling of multiple planes in packages," in *International Zurich Symposium on Electromagnetic Compatibility*, Feb. 2006.
- [52] A. E. Engin, K. Bharath, M. Swaminathan, M. Cases, B. Mutnury, N. Pham, D. N. de Araujo, and E. Matoglu, "Finite-difference modeling of noise coupling between power/ground planes in multilayered packages and boards," in *Proc. Electronic Components and Technology Conference*, May 2006.
- [53] K. J. Han, M. Swaminathan, and E. Engin, "Electric field integral equation combined with cylindrical conduction mode basis functions for electrical modeling of three-dimensional interconnects," *Design Automation Conference, 2008. DAC 2008. 45th ACM/IEEE*, pp. 421–424, June 2008.
- [54] J. Chandrasekhar, E. Engin, M. Swaminathan, K. Uriu, and T. Yamada, "Noise induced jitter in differential signaling," *Electronic Components and Technology Conference, 2008. ECTC 2008. 58th*, pp. 1755–1761, May 2008.
- [55] K. J. Han, M. Swaminathan, and E. Engin, "Wideband electrical modeling of large three-dimensional interconnects using accelerated generation of partial impedances with cylindrical conduction mode basis functions," in *Microwave Symposium Digest, 2008 IEEE MTT-S International*, jun. 2008, pp. 1297–1300.
- [56] —, "Analysis of horizontal and vertical couplings in bonding wire interconnections using EFIE with cylindrical conduction mode basis functions," *Signal Propagation on Interconnects, 2008. SPI 2008. 12th IEEE Workshop on*, pp. 1–4, May 2008.

- [57] K. Bharath, E. Engin, and M. Swaminathan, "Automatic package and board decoupling capacitor placement using genetic algorithms and M-FDM," *Design Automation Conference, 2008. DAC 2008. 45th ACM/IEEE*, pp. 560–565, June 2008.
- [58] K. J. Han, M. Swaminathan, and E. Engin, "Electrical modeling of wirebonds in stacked ICs using cylindrical conduction mode basis functions," *Electronic Components and Technology Conference, 2008. ECTC 2008. 58th*, pp. 1225–1230, May 2008.
- [59] K. Srinivasan, E. Engin, and M. Swaminathan, "Fast FDTD simulation of multiscale 3D models using laguerre-MNA," *Signal Propagation on Interconnects, 2007. SPI 2007. IEEE Workshop on*, pp. 141–144, May 2007.
- [60] T. H. Kim, E. Engin, M. Swaminathan, and P. Yadav, "Automated tool for electromagnetic band gap (EBG) synthesis in mixed signal applications," *Microwave Conference, 2007. APMC 2007. Asia-Pacific*, pp. 1–4, Dec. 2007.
- [61] K. Bharath, E. Engin, M. Swaminathan, K. Uriu, and T. Yamada, "Computationally efficient power integrity simulation for System-on-Package applications," *Design Automation Conference, 2007. DAC '07. 44th ACM/IEEE*, pp. 612–617, Jun. 2007.
- [62] K. Srinivasan, P. Yadav, E. Engin, and M. Swaminathan, "Choosing the right number of basis functions in multiscale transient simulation using laguerre polynomials," in *Proc. Electrical Performance of Electronic Packaging*, Atlanta, GA, Oct. 2007, pp. 291–294.
- [63] M. Swaminathan, T. H. Kim, E. Engin, and A. Tambawala, "Electromagnetic bandgap structures - design, modeling and integration in mixed signal modules - **Best Paper of the Session Award**," in *International Symposium on Microelectronics*, San Jose, CA, Nov. 2007.
- [64] M. Pathak, S. Mukherjee, M. Swaminathan, E. Engin, and S. K. Lim, "Placement and routing of RF embedded passive designs in LCP substrate," in *IEEE International Conference on Computer Design*, Lake Tahoe, CA, Oct. 2007.
- [65] N. Sankaran, B.-W. Lee, V. Sundaram, E. Engin, M. Iyer, M. Swaminathan, and R. R. Tummala, "Electrical characterization and design optimization of embedded chip in substrate cavities," in *Proc. Electronic Components and Technology Conference*, Reno, NV, Jun. 2007.
- [66] K. J. Han, E. Engin, and M. Swaminathan, "Cylindrical conduction mode basis functions for modeling of inductive couplings in system-in-package (SiP)," in *Proc. Electrical Performance of Electronic Packaging*, Atlanta, GA, Oct. 2007, pp. 361–364.

- [67] M. Swaminathan and A. E. Engin, "Modeling of signal and power integrity in system on package applications," in *IEEE International Symposium on Electromagnetic Compatibility*, Honolulu, HI, Jul. 2007.
- [68] A. Tambawala, E. Engin, M. Swaminathan, P. Pramanik, K. Yamazaki, and J. Andresakis, "Compact electromagnetic bandgap structures for power plane isolation using high-K dielectrics - **Best Paper Award Finalist in Board-Level Design Category**," in *DesignCon*, Santa Clara, CA, Feb. 2007.
- [69] K. Srinivasan, E. Engin, and M. Swaminathan, "Fast FDTD simulation using Laguerre polynomials in MNA framework," in *IEEE International Symposium on Electromagnetic Compatibility*, Honolulu, HI, Jul. 2007.
- [70] Y. Toyota, K. Iokibe, R. Koga, A. E. Engin, T. H. Kim, and M. Swaminathan, "Miniaturization of electromagnetic bandgap (EBG) structures with high-permeability magnetic metal film," in *IEEE International Symposium on Electromagnetic Compatibility*, Honolulu, HI, Jul. 2007.
- [71] K. Bharath, A. E. Engin, M. Swaminathan, K. Uriu, and T. Yamada, "Signal and power integrity co-simulation for multi-layered system on package modules," in *IEEE International Symposium on Electromagnetic Compatibility*, Honolulu, HI, Jul. 2007.
- [72] K. Srinivasan, M. Swaminathan, and E. Engin, "Enhancement of Laguerre-FDTD with initial conditions for fast transient EM/circuit simulation," in *Proc. Electronic Components and Technology Conference*, Reno, NV, Jun. 2007.
- [73] K. Bharath, E. Engin, M. Swaminathan, K. Uriu, and T. Yamada, "Efficient simulation of power/ground planes for SiP applications," in *Proc. Electronic Components and Technology Conference*, Reno, NV, Jun. 2007.
- [74] P. Muthana, K. Srinivasan, E. Engin, M. Swaminathan, R. Tummala, D. Amey, K. Dietz, and S. Banerji, "I/O decoupling in high speed packages using embedded planar capacitors," in *Proc. Electronic Components and Technology Conference*, Reno, NV, Jun. 2007.
- [75] D. Chung, T. H. Kim, C. Ryu, E. Engin, M. Swaminathan, and J. Kim, "Effect of EBG structures for reducing noise in multi-layer PCBs for digital systems," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 253–256.
- [76] K. Bharath, E. Engin, M. Swaminathan, K. Uriu, and T. Yamada, "Efficient modeling of package power delivery networks with fringing fields and gap coupling in mixed signal systems," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 59–62.

- [77] T. H. Kim, E. Engin, and M. Swaminathan, "Switching noise suppression in mixed signal system applications using electromagnetic band gap (EBG) synthesizer," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 47–50.
- [78] S. N. Lalgudi, K. Srinivasan, G. Casinovi, R. Mandrekar, E. Engin, M. Swaminathan, and Y. Kretchmer, "Causal transient simulation of systems characterized by frequency-domain data in a modified nodal analysis framework," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 123–126.
- [79] K. J. Han, H. Takeuchi, E. Engin, and M. Swaminathan, "Eye-pattern improvement for design of high-speed differential links using passive equalization," in *Proc. Electrical Performance of Electronic Packaging*, Scottsdale, AZ, Oct. 2006, pp. 241–244.
- [80] T. H. Kim, D. Chung, E. Engin, and M. Swaminathan, "A novel synthesis method for designing electromagnetic band gap (EBG) structures in packaged mixed signal systems - **Outstanding poster paper award**," in *Proc. Electronic Components and Technology Conference*, May 2006.
- [81] K. Bharath, E. Engin, T. Yoshitaka, and M. Swaminathan, "Modeling of EBG structures using the transmission matrix method," in *Proc. Progress In Electromagnetics Research Symposium*, Mar. 2006.
- [82] Y. Toyota, A. E. Engin, M. Swaminathan, and S. Bhattacharya, "Size reduction of electromagnetic bandgap (EBG) structures with new geometries and materials," in *Proc. Electronic Components and Technology Conference*, May 2006.
- [83] R. Mandrekar, K. Bharath, K. Srinivasan, E. Engin, and M. Swaminathan, "System level signal and power integrity analysis methodology for system-in-package applications," in *Design Automation Conference*, San Francisco, CA, Jul. 2006.
- [84] K. Srinivasan, P. Muthana, R. Mandrekar, E. Engin, J. Choi, and M. Swaminathan, "Enhancement of signal integrity and power integrity with embedded capacitors in high-speed packages," in *International Symposium on Quality Electronic Design*, San Jose, CA, Mar. 2006.
- [85] Y. Toyota, A. E. Engin, T. H. Kim, M. Swaminathan, and K. Uriu, "Stop-band prediction with dispersion diagram for electromagnetic bandgap structures in printed circuit boards," in *IEEE International Symposium on Electromagnetic Compatibility*, Portland, OR, Aug. 2006.
- [86] I. R. Abothu, B.-W. Lee, P. M. Raj, E. Engin, P. Muthana, C. K. Yoon, M. Swaminathan, and R. R. Tummala, "Tailoring the temperature coefficient of capacitance (TCC), dielectric loss and capacitance density with ceramic-polymer nanocomposites for RF applications," in *Proc. Electronic Components and Technology Conference*, May 2006.

- [87] P. Muthana, E. Engin, M. Swaminathan, R. Tummala, V. Sundaram, L. Wan, S. Bhattacharya, P. Raj, K. Lee, M. Varadarajan, and I. R. Abothu, "Measurement, modeling and characterization of embedded capacitors for power delivery in the mid-frequency range," in *Annual Symposium on Microelectronics*, Sep. 2005.
- [88] P. Muthana, M. Swaminathan, R. Tummala, P. Raj, E. Engin, L. Wan, D. Balaraman, and S. Bhattacharya, "Design, modeling and characterization of embedded capacitor networks for mid-frequency decoupling in semiconductor systems," in *IEEE International Symposium on Electromagnetic Compatibility*, Chicago, Aug. 2005.
- [89] P. Muthana, M. Swaminathan, E. Engin, P. M. Raj, and R. Tummala, "Mid frequency decoupling using embedded decoupling capacitors," in *Proc. Electrical Performance of Electronic Packaging*, Austin, Oct. 2005, pp. 271–274.
- [90] R. Mandrekar, K. Srinivasan, E. Engin, and M. Swaminathan, "Co-simulation of signal and power delivery networks with causality," in *Proc. Electrical Performance of Electronic Packaging*, Austin, Oct. 2005, pp. 337–340.
- [91] K. Srinivasan, R. Mandrekar, E. Engin, and M. Swaminathan, "Power integrity/signal integrity co-simulation for fast design closure," in *Proc. Electronics Packaging Technology Conference*, Singapore, Dec. 2005.
- [92] W. Yun, A. Bavisi, V. Sundaram, M. Swaminathan, and E. Engin, "3D integration and characterization of high Q passives on multilayer liquid crystalline polymer (M-LCP) based substrate - **Best student paper award**," in *Asia Pacific Microwave Conference*, China, Dec. 2005.
- [93] A. E. Engin, W. Mathis, W. John, G. Sommer, and H. Reichl, "Time-domain modeling of lossy substrates with constant loss tangent," in *Proc. IEEE Workshop on Signal Propagation on Interconnects*, Heidelberg, Germany, May 2004.
- [94] A. E. Engin, W. John, G. Sommer, and W. Mathis, "Three-conductor modeling of striplines at via discontinuities," in *Proc. EMC'04 Sendai*, Sendai, Japan, Jun. 2004, pp. 61–64.
- [95] A. E. Engin, W. Mathis, W. John, and G. Sommer, "Lumped skin-effect model for interconnects," in *International Symposium on Signals, Systems, and Electronics ISSSE'04*, Linz, Austria, Aug. 2004.
- [96] E. Engin, M. Coenen, H. Köhne, G. Sommer, and W. John, "Three-wire analysis model to predict SI and EMC effects," in *Proc. EMC'04 Sendai*, Sendai, Japan, Jun. 2004.



- [97] A. E. Engin, W. Mathis, W. John, and G. Sommer, "Time-domain modeling of skin effect for improved SI analysis of interconnect systems and packages," in *EUROEM'04*, Magdeburg, Germany, Jul. 2004.
- [98] A. E. Engin, M. Coenen, H. Köhne, G. Sommer, and W. John, "Modeling and analysis of the return path discontinuity caused by vias using the 3-conductor model," in *IEEE International Symposium on Electromagnetic Compatibility*, Istanbul, Turkey, May 2003.
- [99] A. E. Engin, W. John, G. Sommer, and W. Mathis, "Modeling of non-ideal planes in stripline structures," in *Proc. Electrical Performance of Electronic Packaging*, Princeton, USA, Oct. 2003, pp. 247–250.
- [100] E. Engin, M. Coenen, H. Köhne, G. Sommer, and W. John, "Three-pole analysis model to predict SI and EMC effects," in *EMC Compo, 3rd International Workshop on Electromagnetic Compatibility of Integrated Circuits*, Toulouse, France, Nov. 2002, pp. 105–108.

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## INVENTIONS

- [1] A. E. Engin, G. Aguirre, K.-d. Lang, and I. Ndip, "Non-overlapping power/ground planes for localized power distribution network design - **United States Patent: US 2021/0153341 A1**. applications also filed in germany, china, and japan," May 2021.
- [2] A. E. Engin and M. Swaminathan, "Multilayer finite difference methods for electrical modeling of packages and printed circuit boards - **United States Patent: 7,895,540**," Feb. 2011.
- [3] M. Swaminathan, A. E. Engin, P. Muthana, and L. Wan, "Packaging having an array of embedded capacitors for power delivery and decoupling in the mid-frequency range and methods of forming thereof - **United States Patent: 7,504,706**," march 2009.
- [4] M. Swaminathan, A. E. Engin, P. Muthana, and K. Srinivasan, "Device having an array of embedded capacitors for power delivery and decoupling of high speed input/output circuitry of an integrated circuit - **United States Patent: 7,705,423**," april 2010.
- [5] T. H. Kim, A. E. Engin, and M. Swaminathan, "Systems and methods for electromagnetic band gap structure synthesis - **United States Patent: 8,060,457**," Nov. 2011.

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## SERVICE

SDSU: Senator at the University Senate for the 2014-2020 term.

- Short courses: Lead speaker at the IEEE Santa Clara Valley - Electromagnetic Compatibility Mini Symposium (IEEE SCV-EMC 2012). 3/4 day speech on "Fundamentals of Signal and Power Integrity," October 11, 2012.
- Lead speaker at IMAPS San Diego Chapters Technical Presentation and Lunch on September 24, 2017. Presentation on "High-Frequency Characterization of Chip Package Substrates."
- Session Chair and Organizer for half-day tutorials on "Fundamentals of Signal Integrity" at *IEEE International Symposium on Electromagnetic Compatibility, 2012-2014*.
- Clayton R. Paul Global EMC And SI University Instructor, "Introduction to Power Integrity," *2015 IEEE Symposium on Electromagnetic Compatibility and Signal Integrity*, may 2015.
- Keynote speech "Electromagnetic Simulation for Power Integrity: From Analysis to Design at Signal Integrity & Power Integrity Technical Seminar" in Silicon Valley on February 4, 2011 and at EMC/SI/PI Seminar in San Diego on May 13, 2011.
- Committees: Board Member in IMAPS San Diego Chapter, 2019-present.
- Editorial Board Member of *Frontiers in Micro- and Nanoelectromechanical Systems* as a Review Editor, 2021-present.
- Student Activities Chair for the *International Symposium on Microelectronics, IMAPS 2012 & 2014*.
- Paper Review Committee Member in *IEEE Electrical Performance of Electronic Packaging Conference* (2016-present).
- Technical Program Committee Member in *Electrical Design of Advanced Packaging & Systems Symposium* (2008).
- Technical Program Committee Member in *Electronics Packaging Technology Conference* (since 2009).
- NSF Panel: Reviewer for the Communications, Circuits, and Sensing-Systems (CCSS) program of the National Science Foundation's Division of Electrical, Communications and Cyber Systems (ECCS).
- Webinars: Technical Webinar Instructor to Support Japan Earthquake and Tsunami Relief, "Electromagnetic Simulation for Power Integrity: From Analysis to Design," April 21, 2011.
- A. Ege Engin and Ivan Ndip, "Electrical Modeling, Analysis and Optimization of Electronic Packaging Structures for Signal and Power Integrity," IMAPS webinar, October 13 and 20, 2009 and June 15 , 22 and 29, 2010.

Journal Review: Associate Editor for IEEE Transactions on Electromagnetic  
Compatibility

IEEE Transactions on Advanced Packaging

IEEE Transactions on Microwave Theory and Techniques

IEEE Transactions on Very Large Scale Integration (VLSI)  
Systems

Memberships: Institute of Electrical and Electronics Engineers (IEEE)

International Microelectronics And Packaging Society (IMAPS)