Stanford

Constantine Sideris

Associate Professor of Electrical Engineering

Bio

BIO

Constantine Sideris is an Associate Professor of Electrical Engineering at Stanford University. Previously, he was an Assistant Professor at the University of Southern California from 2018 to 2025 and an Associate Professor from 2025 to 2026. He received the B.S., M.S., and Ph.D. degrees with honors from the California Institute of Technology in 2010, 2011, and 2017 respectively. He was a visiting scholar at UC Berkeley's Wireless Research Center from 2013 to 2014. He was a postdoctoral fellow in the departments of Electrical Engineering and Computing and Mathematical Sciences at Caltech from January 2017 to August 2018.

He was the recipient of an ONR YIP award in 2023, an NSF CAREER award in 2021, an AFOSR YIP award in 2020, an AFOSR DURIP award in 2021, the Caltech Leadership Award in 2017, and an NSF graduate research fellowship in 2010. His research is highly interdisciplinary and bridges the fields of bioengineering, medicine, applied mathematics and computation with electrical engineering and physics.

His research interests include analog/RF integrated circuits, photonic integrated circuits, and computational electromagnetics for biomedical and biosensing applications and wireless communications. His current interests in biomedical devices include portable Point-of-Care in-vitro biosensors, wearable devices for real-time monitoring and analysis of biological signals, ingestible "smart" pills, and implantable devices. His current interests in computational electromagnetics include developing fast algorithms for simulating RF and nanophotonic devices and coupling them with efficient optimization algorithms to achieve the automated design of new, high-performance electromagnetic devices.

ACADEMIC APPOINTMENTS

- Associate Professor, Electrical Engineering
- Member, Bio-X

PROGRAM AFFILIATIONS

- Stanford SystemX Alliance

LINKS

- ACME Research Group Website: https://acme.stanford.edu

Teaching

COURSES

2026-27

- Computational Electromagnetics: EE 292L (Win)
- Silicon Bring-Up: Post-Silicon Validation and Characterization: EE 372B (Aut)

2025-26

- Computational Electromagnetics: EE 292L (Win)
- Design Projects in VLSI Systems I: EE 272 (Win)
- Design Projects in VLSI Systems II: EE 372 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Leen Abdul Razzak, Heather Chang, Clarissa Daniel

Postdoctoral Faculty Sponsor

Vinay Chenna, Bernd Hofmann, Jung Hyun Yoon

Master's Program Advisor

Adi Telikicherla, Sage Wu, Tyler Yamori-Little

Doctoral (Program)

Katerina Baxter, Garrett Knuf, Thao Nguyen, Wendy Tan

Publications

PUBLICATIONS

- **Advanced Electromagnetics Methods for Practical Engineering Applications** *IEEE ANTENNAS AND PROPAGATION MAGAZINE*
  Sideris, C.
  2026; 68 (3): 10-11
- **Fast 3D Nanophotonic Inverse Design Using Volume Integral Equations** *ACS PHOTONICS*
  Fallah, A., Sideris, C.
  2026
- **Rapid Full-Wave Training-Data Synthesis for Deep-Learning Surrogates** *IEEE MICROWAVE AND WIRELESS TECHNOLOGY LETTERS*
  Chenna, V., Ho, J., Sun, J., Sideris, C.
  2026
- **Advanced Electromagnetics Methods for Practical Engineering Applications** *IEEE ANTENNAS AND PROPAGATION MAGAZINE*
  Sideris, C.
  2026; 68 (2): 8-9
- **Near real-time full-wave inverse design of electromagnetic devices.** *Nature communications*
  Sun, J. H., Elsawaf, M., Zheng, Y., Lin, H. C., Hsu, C. W., Sideris, C.
  2026
- **A High-Order Fast Boundary Element Method as a Benchmarking Computational Framework for RCS Analysis of PEC Targets** *Open Journal of Antennas and Propagation*
  Babazadeh, O., Sever, E., Jeffrey, I., Sideris, C., Okhmatovski, V. I.
  2026
- **A Negative Impedance Converter Design to Enhance Capacitive Conduction Through a Neurostimulator Electrode Interface.** *IEEE transactions on bio-medical engineering*
  Iseri, E., Machnoor, M., Nguyen, T. D., Sideris, C., Gokoffski, K. K., Lazzi, G.
  2026; 73 (1): 322-332

- **A Sub-Gram Individual Plant Stress Sensor Tag for Smart Farming** *International Solid State Circuits Conference*
  Nitto, D., Yanase, K., Fujisawa, Y., Shiomi, J., Midoh, Y., Wadatsumi, T., Nagata, M., Oncu, A., Sideris, C., Suriyasak, C., Ishibashi, Y., Miura, N.
  2026
- **Concurrent On-Chip Dual-Mode Substrate-Integrated Waveguide for Sub-THz Applications** *IEEE MICROWAVE AND WIRELESS TECHNOLOGY LETTERS*
  Elsawaf, M., Maggi, A., Sideris, C.
  2025; 35 (12): 1945-1948
- **High order-accurate solution of scattering integral equations with unbounded solutions at corners** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Sideris, C., Aslanyan, D., Bruno, O. P.
  2025; 539
- **Accelerated Boundary Integral Solution of 3-D Maxwell's Equations Using the Interpolated Factored Green Function Method** *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*
  Paul, J., Sideris, C.
  2025; 73 (6): 3814-3826
- **Exploring the Feasibility of Bidirectional Spinal Cord Machine Interface Through Sensing and Stimulation of Axonal Bundles.** *IEEE transactions on neural systems and rehabilitation engineering : a publication of the IEEE Engineering in Medicine and Biology Society*
  Lo, Y. T., Maggi, A., Wu, K., Zhong, H., Choi, W., Nguyen, T. D., Abedi, A., Agyeman, K., Sakellaridi, S., Reggie Edgerton, V., Kreydin, E., Lee, D., Sideris, et al
  2025; 33: 2004-2012
- **Drift-Compensated Magnetic Biosensors Using Concurrent Dual-Frequency Oscillators** *IEEE JOURNAL OF SOLID-STATE CIRCUITS*
  Sun, J., Sideris, C.
  2025; 60 (9): 3164-3173
- **Frequency-Division Multiplexed Magnetic Induction Based Wireless Wearable Sensor Network for Real-Time Motion Tracking** *Symposium on VLSI Technology and Circuits*
  Rustom, M., Farhadian, A., Nguyen, T., Moghaddam, M., Sideris, C.
  2025
- **Optimal Preconditioners for Hybrid Direct-Iterative H-Matrix Solvers in Boundary Element Methods** *IEEE JOURNAL ON MULTISCALE AND MULTIPHYSICS COMPUTATIONAL TECHNIQUES*
  Babazadeh, O., Sever, E., Hu, J., Jeffrey, I., Sideris, C., Okhmatovski, V.
  2025; 10: 187-197
- **Mitigating Edge Singularities in Point-Based Discretization of Integral Equations: A Study on Mixed-Order Discretization (p-Refinement) Coupled with Local h-Refinement** *International Applied Computational Electromagnetics Society Symposium*
  Babazadeh, O., Sever, E., Hu, J., Jeffrey, I., Sideris, C., Okhmatovski, V.
  2025
- **A High-Order Accurate Combined Field Integral Equation Solver for Scattering Problems in Domains with Corners** *International Applied Computational Electromagnetics Society Symposium*
  Aslanyan, D., Bruno, O. P., Sideris, C.
  2025
- **Accelerated Chebyshev-Based Nyström Scheme for Boundary Integral Equation for Electromagnetic Scattering Using Interpolated Factored Green Function** *International Applied Computational Electromagnetics Society Symposium*
  Paul, J., Sideris, C.
  2025
- **Heterogeneous Tolerance Strategies in H-LU Decomposition for Integral Equations** *IEEE CNC-USNC-URSI North American Radio Science Meeting*
  Babazadeh, O., Sever, E., Hu, J., Jeffrey, I., Sideris, C., Okhmatovski, V. I.
  2025
- **Fast Inverse Design Using the Precomputed Numerical Green Function Method** *International Conference on Electromagnetics in Advanced Applications*

Sun, J., Sideris, C.
2025

- **Nyström Discretization of an Integral Equation Based Electromagnetic Scattering Formulation for Composite Structures** *International Conference on Electromagnetics in Advanced Applications*
  Hofmann, B., Sideris, C.
  2025

- **A 3.5×3.5mm2 1.47mW/ch 16-Channel MSS-CMOS Heterogeneous Multi-Modal-Gas-Sensor Chip Stack** *International Solid State Circuits Conference*
  Naruse, K., Kato, N., Matsumori, T., Shlomi, J., Midoh, Y., Hirose, T., Imamura, G., Yoshikawa, G., Sideris, C., Miura, N.
  2025

- **Concurrent Mode-Division Multiplexed Half-Mode Substrate-Integrated Waveguide Link With Three Independent Data Channels** *IEEE JOURNAL OF MICROWAVES*
  Elsawaf, M., Sideris, C.
  2025; 5 (1): 150-159

- **Design and Implementation of Integrated Dual-Mode Pulse and Continuous-Wave Electron Paramagnetic Resonance Spectrometers.** *IEEE transactions on biomedical circuits and systems*
  Sun, J. H., Wu, D., Qin, P., Sideris, C.
  2024; 18 (6): 1209-1219

- **A High-Order Nystrom-Based Scheme Explicitly Enforcing Surface Density Continuity for the Electric Field Integral Equation** *IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS*
  Hu, J., Sideris, C.
  2024; 23 (9): 2633-2637

- **Ultralow Power In-Sensor Neuronal Computing with Oscillatory Retinal Neurons for Frequency-Multiplexed, Parallel Machine Vision.** *ACS nano*
  Ahsan, R., Chae, H. U., Jalal, S. A., Wu, Z., Tao, J., Das, S., Liu, H., Wu, J. B., Cronin, S. B., Wang, H., Sideris, C., Kapadia, R.
  2024

- **End-to-end design of ingestible electronics** *NATURE ELECTRONICS*
  Abdigazy, A., Arfan, M., Lazzi, G., Sideris, C., Abramson, A., Khan, Y.
  2024; 7 (2): 102-118

- **Concurrent Dual-Mode Directional Coupler for Mode-Division Multiplexed Multidrop Substrate-Integrated Waveguide-Based Links** *IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES*
  Elsawaf, M., Sideris, C.
  2024; 72 (8): 4734-4743

- **A 12 V Compliant Multichannel Dual Mode Neural Stimulator With 0.004% Charge Mismatch and a 4 x V_{DD} Tolerant On-Chip Discharge Switch in Low-Voltage CMOS** *IEEE SOLID-STATE CIRCUITS LETTERS*
  Nguyen, T., Maggi, A., Lazzi, G., Sideris, C.
  2024; 7: 283-286

- **The 2023 IEEE Microwave Theory and Technology Society International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization [Conference Report]** *IEEE MICROWAVE MAGAZINE*
  Okhmatovski, V., Aronsson, J., Jeffrey, I., Sarris, C., Aygun, K., Sideris, C., Thiel, W.
  2024; 25 (1): 82-84

- **A Portable 14GHz Dual-Mode Pulse and Continuous-Wave Electron Paramagnetic Resonance Spectrometer Using a Subharmonic Direct Conversion Receiver** *International Solid State Circuits Conference*
  Sun, J., Rustom, M., Nguyen, T., Singh, J., Qin, P., Sideris, C.
  2024

- **GPU Acceleration Using CUDA for Computational Electromagnetics** *International Applied Computational Electromagnetics Society Symposium*
  Sideris, C.
  2024

- **Inverse Design of Nanophotonic and Radio-Frequency Devices using Fast Maxwell Solvers** *International Applied Computational Electromagnetics Society Symposium*
  Aslanyan, D., Zheng, Y., Hu, J., Sideris, C.
  2024
- **Parallel Fast Iterative H-Matrix-Accelerated Locally Corrected Nyström Method with an Unreliable H-matrix Based Preconditioner** *International Applied Computational Electromagnetics Society Symposium*
  Babazadeh, O., Hu, J., Sever, E., Jeffrey, I., Sideris, C., Okhmatovski, V.
  2024
- **Algorithmic Acceleration of the Chebyshev-based Boundary Integral Equation Method for 3D Maxwell Problems using the Interpolated Factored Green Function** *International Applied Computational Electromagnetics Society Symposium*
  Paul, J., Sideris, C.
  2024
- **Parallel Fast Direct Error-Controlled Scattering Solutions via an H-Matrix-Accelerated Locally Corrected Nystrom Method for the Combined Field Integral Equation**
  Babazadeh, O., Hu, J., Sever, E., Jeffrey, I., Sideris, C., Okhmatovski, V., IEEE
  IEEE.2024: 462-465
- **Dual-Channel Half-Mode Substrate-Integrated Waveguide Link Utilizing Mode Division Multiplexing**
  Elsawaf, M., Sideris, C., IEEE
  IEEE.2024: 632-635
- **On Convergence of Iterative Matrix Solver Preconditioned with H-Matrix in Locally Corrected Nyström Discretization of CFIE**
  Babazadeh, O., Hu, J., Sever, E., Jeffrey, I., Sideris, C., Okhmatovski, V.
  2024
- **Improving Stimulation Tolerance for Implantable Neurostimulators Through Enhanced Capacitive Conduction** *INC-USNC-URSI Radio Science Meeting*
  Iseri, E., Nguyen, T. D., Sideris, C., Kimberly, K. K., Lazzi, G.
  2024
- **Data-efficient and Ultra-fast Surrogate Models for Simulating Nanophotonic Power-splitters** *International Symposium on Antennas and Propagation*
  Gupta, A., Khankhoje, U. K., Sideris, C.
  2024
- **Parallel Fast Iterative H-Matrix Locally Corrected Nyström Discretization of Integral Equations with an Inaccurate H-matrix Preconditioner** *International Conference on Electromagnetics in Advanced Applications*
  Babazadeh, O., Hu, J., Sever, E., Jeffrey, I., Sideris, C., Okhmatovski, V.
  2024
- **A High-Order-Accurate 3D Surface Integral Equation Solver for Uniaxial Anisotropic Media** *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*
  Hu, J., Sideris, C.
  2023; 71 (5): 4262-4271
- **A Boundary Integral Method for 3-D Nonuniform Dielectric Waveguide Problems via the Windowed Green Function** *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*
  Garza, E., Sideris, C., Bruno, O. P.
  2023; 71 (4): 3758-3763
- **Design and Implementation of a Low Power Wireless Frequency-Division Multiplexed Magnetic 3D Localization Scheme With Sub-mm Precision for Capsule Endoscopy Applications** *IEEE SOLID-STATE CIRCUITS LETTERS*
  Rustom, M., Sideris, C.
  2023; 6: 37-40
- **p-Adaptive Quadrature for the Chebyshev-based Boundary Integral Equation Method** *International Applied Computational Electromagnetics Society Symposium*
  Aslanyan, D., Sideris, C.

2023

- **Ultra-fast Simulation and Inverse Design of Metallic Antennas** *International Microwave Symposium*
  Zheng, Y., Sideris, C.
  2023
- **Concurrent Multi-Mode Excitation for Mode Division Multiplexing over Substrate Integrated Waveguides** *International Microwave Symposium*
  Elsawaf, M., Sideris, C. H.
  2023
- **Concurrent Dual Polarization Dielectric Waveguide Interconnect using Inverse Designed Dual-Mode Surface Antenna Launcher** *International Symposium on Antennas and Propagation*
  Huang, J., Molisch, A., Sideris, C.
  2023
- **Nanophotonic Simulation and Inverse Design using Fast High-order Chebyshev-based Nystrom Methods**
  Aslanyan, D., Hu, J., Sideris, C., IEEE
  IEEE.2023: 287
- **Fast Inverse Design of 3D Nanophotonic Devices Using Boundary Integral Methods** *ACS PHOTONICS*
  Garza, E., Sideris, C.
  2023; 10 (4): 824-835
- **Foundry-fabricated grating coupler demultiplexer inverse-designed via fast integral methods** *COMMUNICATIONS PHYSICS*
  Sideris, C., Khachaturian, A., White, A. D., Bruno, O. P., Hajimiri, A.
  2022; 5 (1)
- **A Drift-Compensated Magnetic Spectrometer for Point-of-Care Wash-Free Immunoassays using a Concurrent Dual-Frequency Oscillator**
  Sun, J., Ling, B., Kaiser, M., Sideris, C., IEEE
  IEEE.2022: 173-176
- **H-Matrix Accelerated Direct Matrix Solver using Chebyshev-based Nystrom Boundary Integral Equation Method**
  Hu, J., Sever, E., Babazadeh, O., Gholami, R., Okhmatovski, V., Sideris, C., IEEE
  IEEE.2022: 16-19
- **Wireless Frequency-Division Multiplexed 3D Magnetic Localization for Low Power Sub-mm Precision Capsule Endoscopy** *Custom Integrated Circuits Conference*
  Rustom, M., Sideris, C.
  2022
- **A Chebyshev-Based High-Order-Accurate Integral Equation Solver for Maxwell's Equations** *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*
  Hu, J., Garza, E., Sideris, C.
  2021; 69 (9): 5790-5800
- **High-order Chebyshev-based Nyström Methods for Electromagnetics** *International Applied Computational Electromagnetics Society Symposium*
  Garza, E., Hu, J., Sideris, C.
  2021
- **Planewave Density Interpolation Methods for the EFIE on Simple and Composite Surfaces** *IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION*
  Perez-Arancibia, C., Turc, C., Faria, L. M., Sideris, C.
  2021; 69 (1): 317-331
- **High-Order Accurate Integral Equation Based Mode Solver for Layered Nanophotonic Waveguides**
  Hu, J., Garza, E., Perez-Arancibia, C., Sideris, C., IEEE
  IEEE.2021: 128-131
- **Nonlinear nanophotonic devices in the ultraviolet to visible wavelength range**
  He, J., Chen, H., Hu, J., Zhou, J., Zhang, Y., Kovach, A., Sideris, C., Harrison, M. C., Zhao, Y., Armani, A. M.

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- **Monolithic High-Mobility InAs on Oxide Grown at Low Temperature** *ACS APPLIED ELECTRONIC MATERIALS*
  Sarkar, D., Tao, J., Ahsan, R., Yang, D., Orvis, T., Weng, S., Greer, F., Ravichandran, J., Sideris, C., Kapadia, R.
  2020; 2 (7): 1997-2002
- **High mobility large area single crystal III-V thin film templates directly grown on amorphous SiO₂ on silicon** *APPLIED PHYSICS LETTERS*
  Tao, J., Sarkar, D., Weng, S., Orvis, T., Ahsan, R., Kale, S., Xu, Y., Chae, H., Greer, F., Ravichandran, J., Sideris, C., Kapadia, R.
  2020; 117 (4)
- **A Fully Integrated, Dual Channel, Flip Chip Packaged 113 GHz Transceiver in 28nm CMOS supporting an 80 Gb/s Wireless Link** *Custom Integrated Circuits Conference*
  Townley, A., Baniasadi, N., Krishnamurthy, S., Sideris, C., Hajimiri, A., Alon, E., Niknejad, A.
  2020
- **Ultrafast Simulation and Optimization of Nanophotonic Devices with Integral Equation Methods** *ACS PHOTONICS*
  Sideris, C., Garza, E., Bruno, O. P.
  2019; 6 (12): 3233-3240
- **Design and Implementation of Reference-Free Drift-Cancelling CMOS Magnetic Sensors for Biosensing Applications** *IEEE JOURNAL OF SOLID-STATE CIRCUITS*
  Sideris, C., Khial, P. P., Hajimiri, A.
  2018; 53 (11): 3065-3075
- **A 0.3ppm Dual-Resonance Transformer-Based Drift-Cancelling Reference-Free Magnetic Sensor for Biosensing Applications**
  Sideris, C., Khial, P., Ling, B., Hajimiri, A., IEEE
  IEEE.2018: 190-+
- **Binary particle swarm optimized 2 × 2 power splitters in a standard foundry silicon photonic platform.** *Optics letters*
  Mak, J. C., Sideris, C., Jeong, J., Hajimiri, A., Poon, J. K.
  2016; 41 (16): 3868-71
- **Automated Design of a 3D Printed Waveguide Surface Coupler**
  Sideris, C., Hajimiri, A., Yang, C., Wu, S., Sammoura, F., Lin, L., Aloe, E., IEEE
  IEEE.2015: 318-319
- **Design and implementation of an integrated magnetic spectrometer for multiplexed biosensing.** *IEEE transactions on biomedical circuits and systems*
  Sideris, C., Hajimiri, A.
  2013; 7 (6): 773-84
- **An Integrated Magnetic Spectrometer for Multiplexed Biosensing**
  Sideris, C., Hajimiri, A., IEEE
  IEEE.2013: 300-U1168
- **A CMOS Broadband Power Amplifier With a Transformer-Based High-Order Output Matching Network**
  Wang, H., Sideris, C., Hajimiri, A.
  IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.2010: 2709-2722
- **A frequency-shift based CMOS magnetic biosensor with spatially uniform sensor transducer gain** *Custom Integrated Circuits Conference*
  Wang, H., Sideris, C., Hajimiri, A.
  2010
- **An Ultrasensitive CMOS Magnetic Biosensor Array with Correlated Double Counting Noise Suppression**
  Wang, H., Kosai, S., Sideris, C., Hajimiri, A., IEEE
  IEEE.2010: 616-619
- **Effects of Charcoal Matter and Effective Microorganism on Compost Maturity of Green Waste**
  Wang, H., Sun, X., Li, S.
  edited by Zhang, Y.

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