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** The photo on the cover page is the statue of Neil Armstrong, the first man to walk on the moon. Photo credit to Purdue Marketing and Media.

Welcome Message from the Conference General Chair

Dear Colleagues and Friends,

Welcome to NEMO2019, the first time NEMO is held in the United States!

Founded by the IEEE Microwave Theory and Techniques Society (MTT-S), and started in 2014, NEMO is an annual focal event on electromagnetics- and multiphysics-based computer-aided design (EM-CAD), rotating between Europe, North America and Asia.

NEMO2019 aims to stimulate a broad discussion and exploration of disruptive technologies of EM-CAD in addition to traditional topics. Organized by the conference committee, NEMO2019 features a strong technical program, taken part by active and premium research groups in the field. It has six keynote speeches from prominent researchers in multidisciplinary fields, five tutorials by recognized experts from academia, research institutes, and industry; and a multitude of special and focus sessions of advanced topics. The conference is also strengthened by an industry program with generous industry sponsorship, and a visionary panel representing the industry forefront of the research area. A Women in NEMO panel event engaging both men panelists and women leaders further enriches the conference in cultivating and promoting the diversity in NEMO related areas. A focus session on commercial tools and exhibitions from CAD companies highlight the latest in commercial software.

NEMO2019 is generously sponsored by the School of Electrical and Computer Engineering at Purdue University, West Lafayette, IN, USA, Intel Corporation, Huawei Technologies, IEEE Women in Microwaves, and IEEE Antennas and Propagation Society. We sincerely thank these organizations and companies for their support that helps the success of this conference.



Countries of NEMO2019 authors.

In this year's NEMO, we hope to combine big-conference breadth and depth with small-conference charm, convenience, and inclusiveness. The conference offers a diverse, friendly, and inclusive social program, with a designated social program chair whose job is to make General Chair go bankrupt. We customize the social program to best suit your needs, and we aim to break the barriers between different research fields, and to help you get to know more friends and colleagues in NEMO community.

Our conference venue (Boston Marriott Cambridge) is right next to Massachusetts Institute of Technology, minutes to Harvard, Charles River; and within easy reach of downtown Boston, and BOS airport. Ranked as the number one U.S. summer vacation spot by U.S. News & World Report, Boston has something for everyone.

Shown on the cover page, besides the beautiful Boston skyline and mayflower, is Neil Armstrong, the most well-known Purdue Alumni, who is the first human to set foot on the moon. When Armstrong stepped onto the lunar surface, he said: "That's one small step for a man, one giant leap for mankind." The authors of NEMO2019 come from 24 countries across the world from North America, Latin America, to Europe, Middle East, Africa, and to Asia Pacific. If every one of us moves one small step out of the field we are familiar with, that will also lead to a big leap in the NEMO field. Enjoy the conference and come together to discover the next big thing!



Dan Jiao (Conference General Chair)

Organizing Committee

NEMO2019 Conference Chair



Dan Jiao
Purdue University, USA
Conference General Chair

NEMO2019 Technical Program Chairs

Costas Sarris

University of Toronto,
Canada |
Technical Program
Chair



Hossein Mosallaei

Northeastern University,
USA | Technical
Program Co-Chair



Organizing Committee

Jilin Tan

Alta Dynamics Inc, USA
| Finance and Exhibition



Maokun Li

Tsinghua University,
China |
Registration



Hualiang Zhang

University of
Massachusetts Lowell,
USA | Publication



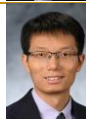
Abdulkadir Yucel

Nanyang Technological
University, Singapore |
Local Arrangement



Zheng Zhang

University of California
Santa Barbara, USA |
Special Sessions



Zhixiang Huang

Anhui University, China |
Publicity



Roberto Gómez-García

University of Alcalá,
Spain |
Publicity



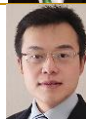
Saad Omar

Schlumberger-Doll
Research, USA |
Student Paper
Competition



Zhen Peng

University of New
Mexico, USA |
Focus Session



Su Yan

Howard University, USA
| Tutorial/Short Course



Valentín de la Rubia

Universidad Politécnica
de Madrid, Spain |
Social Program



Olena Zhu

Intel Corporation, USA |
Industry



Wei E. I. Sha

Zhejiang University,
China |
Social Media Publicity



Zhizhang (David)

Chen, Dalhousie
University, Canada |
IMS Liaison



Technical Program Committee

Costas Sarris

University of Toronto, Canada – TPC Chair

Hossein Mosallaei

Northeastern University, USA – TPC Co-Chair

Dr. Peter Aaen

University of Surrey

Prof. Fritz Arndt

University of Bremen

Dr. Adrian Bekasiewicz

Gdansk University of Technology

Prof. Vicente Boria

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Prof. Maurizio Bozzi

University of Pavia

Mr. Amelia Bretones

University of Granada

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Dalhousie University

Dr. Qingsha Cheng

Southern Univ. of Science and Technology, China

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Universidad Politecnica de Madrid

Dr. Dirk de Villiers

Stellenbosch University

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Ghent University

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University of Cagliari

Mr. Miguel Ferrando-Bataller

Universitat Politècnica de València

Prof. Francesco Ferranti

IMT Atlantique

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University of Bordeaux

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University of Alcalá

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Institute of High Performance Computing

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Southeast University

Prof. Tzyy-Sheng Jason Horng

National Sun Yat-sen University

Prof. Zhixiang Huang

Anhui University

Prof. J. Pieter Jacobs

University of Pretoria

Prof. Slawomir Koziel

Reykjavik University

Prof. Piotr Kurgan

Reykjavik University

Dr. Dennis Lee

Sandia National Laboratories

Dr. Leifur Leifsson

Iowa State University

Prof. Er-Ping Li

Zhejiang University

Mr. Sergio Llorente-Romano

Universidad Carlos III de Madrid

Prof. Jesus Martel

Universidad de Sevilla

Prof. Jorge Martinez

Universitat Politecnica de Valencia

Dr. Alejandro Javier Martinez-Ros

Universidad de Sevilla

Prof. Francisco Medina	<i>University of Sevilla</i>
Mr. Francisco Mesa	<i>University of Seville</i>
Prof. Michel Nakhla	<i>Carleton University</i>
Prof. Vladimir Okhmatovski	<i>University of Manitoba</i>
Dr. Saad Omar	<i>Schlumberger-Doll Research, Cambridge, USA</i>
Prof. Luca Perregrini	<i>University of Pavia</i>
Dr. Anna Pietrenko-Dabrowska	<i>Gdansk University of Technology</i>
Prof. Cedric Quendo	<i>Lab-STICC - UBO Brest</i>
Dr. Eva Rajo-Iglesias	<i>University Carlos III of Madrid</i>
Dr. James Rautio	<i>Sonnet Software, Inc.</i>
Dr. Jagadeswara (CJ) Reddy	<i>Altair</i>
Dr. Raúl Rodríguez-Berral	<i>Universidad de Sevilla</i>
Prof. Hendrik Rogier	<i>Ghent University</i>
Prof. Jesus Rubio	<i>University of Extremadura</i>
Prof. Matthias Rudolph	<i>Brandenburg University of Technology</i>
Prof. Jorge Ruiz-Cruz	<i>Universidad Autonoma de Madrid</i>
Prof. Dominique Schreurs	<i>KU Leuven</i>
Prof. Christian Schuster	<i>Hamburg University of Technology</i>
Prof. Wei E. I. Sha	<i>Zhejiang University</i>
Dr. Richard V. Snyder	<i>RS Microwave Company Inc.</i>
Prof. Almudena Suarez	<i>University of Cantabria</i>
Dr. Jose Taboada	<i>University of Extremadura</i>
Dr. Yonatan Afework Tesfahunegn	<i>Reykjavik University</i>
Dr. Cristiano Tomassoni	<i>University of Perugia</i>
Prof. Guido Valerio	<i>Sorbonne Universite - Paris</i>
Prof. Ke Wu	<i>Ecole Polytechnique (University of Montreal)</i>
Dr. Jin Yan	<i>Intel Corporation</i>
Dr. Jong-Gwan Yook	<i>Yonsei University</i>
Prof. Hualiang Zhang	<i>University of Massachusetts Lowell</i>
Prof. Qijun Zhang	<i>Carleton University</i>
Dr. Xingqi Zhang	<i>University of Toronto</i>

On-Site Registration

On-site registration for NEMO2019 will be available on the second floor of the Boston Marriott Cambridge hotel, 50 Broadway, Cambridge, Massachusetts, 02142, USA.

Registration Hours:

Day	Time
Tuesday, May 28	12:00 - 17:40
Wednesday, May 29	08:00 - 17:40
Thursday, May 30	08:00 - 17:40
Friday, May 31	08:00 - 15:30

Registration Fees:

Registration Type	On-Site Registration
IEEE MTT-S Member	USD \$605
IEEE Member	USD \$645
Non-IEEE Member	USD \$770
IEEE MTT-S Student Member	USD \$480
IEEE Student Member	USD \$500
Student Non-IEEE Member	USD \$550
IEEE Life Member	USD \$400

NEMO 2019 Registration Fee Includes:

- Conference Proceedings
- Welcome Reception (May 29 Wed, 18:00 - 21:00)
- Lunch for Industry Panel (May 30 TH, 12:00 - 13:00)
- Banquet (May 30 TH, 18:00 - 21:00)
- Lunch for Women in NEMO Panel (May 31 Fri, 12:00 - 13:00)
- Coffee Breaks for Every Conference Day

Additional ticket for the Banquet is available on site if required: USD \$70.

Opening Ceremony (Salon 4)

Wednesday, May 29, 8:00-8:20

Welcome from IEEE MTT Society President

Dominique Schreurs, *KU Leuven, Belgium*

Welcome from the Conference General Chair

Dan Jiao, *Purdue University, West Lafayette, IN, USA*

KEYNOTE SPEECH 1 (Salon 4)

Progress and Challenges in Kinetic Plasma Modeling for High Power Microwave Devices

Prof. Fernando Teixeira, *Ohio State University.*

Wednesday, May 29, 08:20 - 09:00

Abstract - We review progress and challenges in kinetic plasma modeling by electromagnetic particle-in-cell (EMPIC) algorithms on unstructured grids. These algorithms are implemented in modular CONPIC and BOPIC C++ codes which integrate a matrix-free explicit finite-element (FE) Maxwell solver based on a parallel sparse-approximate inverse algorithm and a first-principles charge-conserving scatter algorithm to transfer charged particle information into dynamic variables on the grid. The Maxwell field solver of the EMPIC algorithm utilizes a mixed FE basis and discretizes the time-dependent coupled first-order Maxwell's system explicitly. The explicit solver approximates the inverse FE system matrix ("mass" matrix) using hierarchical sparsity patterns based on the sparsity pattern of the original matrix. The resulting algorithm effectively accounts for multiscale plasma phenomena. We discuss the application of the developed EMPIC algorithm to the analysis of laboratory plasmas, vacuum electronic devices for generation of high power microwave signals, and RF electronics multipactor effects in harsh space environments.



Fernando L. Teixeira received the Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign, Champaign, IL, USA, in 1999. He was a Post-Doctoral Associate with the Massachusetts Institute of Technology, Cambridge, MA, USA, from 1999 to 2000. He joined The Ohio State University, Columbus, OH, USA, in 2000, where he is currently a Professor in the ElectroScience Laboratory and the Department of Electrical and Computer Engineering. His current research interests include computational electromagnetics and sensor physics. Since joining Ohio State, Dr. Teixeira has served as a Principal Investigator (PI) or co-PI on projects sponsored by the Department of Defense, Department of Energy, National Science Foundation, NASA, and a number of industrial organizations. Dr. Teixeira has published over 180 journal papers in the aforementioned areas and is co-author of the textbook *Radiowave*

Propagation: Physics and Applications (Wiley, 2010). Dr. Teixeira is a Fellow of IEEE and was a recipient of the Career Award from the National Science Foundation, the triennial Booker Fellowship from the International Union of Radio Science, and the Outstanding Young Engineer Award from the IEEE Microwave Society (MTT-S). He served as an Associate Editor and a Guest Editor for *IEEE Antennas and Wireless Propagation Letters*, and a Guest Editor for the journals *Progress In Electromagnetics Research and Remote Sensing*. He currently serves as an Associate Editor for *IET Microwaves, Antennas, and Propagation*.

Multiscale and Multiphysics Modeling in Photonics - I

Wednesday, May 29, 09:00 - 10:20

Wednesday

Organizer: Alexander V. Kildishev, Purdue University, USA

Chairs: Lucie Prokopeva, Purdue University, USA

Wei E. I. Sha, Zhejiang University, China

09:00-09:20	<p>The Bridge between Classical and Quantum Worlds: A Generalized Electromagnetic Model for Plasmonic Nanostructures <i>Zhixiang Huang (Anhui University, P.R. China); Wei E. I. Sha (Zhejiang University, P.R. China); Ming Fang (Anhui University, P.R. China); Xianliang Wu (Anhui University, P.R. China)</i></p>
09:20-09:40	<p>An ab-initio modeling of gas-phase terahertz lasers <i>Fan Wang (Massachusetts Institute of Technology, USA); Steven G. Johnson (Massachusetts Institute of Technology, USA); Henry Everitt (Duke University, USA)</i></p>
09:40-10:00	<p>Polarization-Tunable Metasurfaces: Plasmonic Color Data Storage and Steganography <i>Alexander V. Kildishev (Purdue University, USA); Maowen Song (Birck Nanotechnology Center & Purdue University, USA); Di Wang, Zhaxylyk Kudyshev, Yi Xuan and Zhuoxian Wang (Purdue University, USA); Honglin Yu (Chongqing University, P.R. China); Alexandra Boltasseva and Vladimir Shalaev (Purdue University, USA)</i></p>
10:00-10:20	<p>Design and characterization of an all-optical photonic neural network Based N-path Filters <i>Mario Miscuglio, Armin Mehrabian and Zibo Hu (George Washington University, USA); Shaimaa Azzam (Purdue University, USA); Jonathan George (George Washington University, USA); Alexander V. Kildishev (Purdue University, USA); Matthew Pelton (University of Baltimore, USA); Volker Sorger (The George Washington University, USA)</i></p>

New Techniques of Modeling and Optimization of Microwave Filters - I

Wednesday, May 29, 09:00 - 10:20

Organizers: Dimitra Psychogiou, University of Colorado Boulder, USA
 Roberto Gómez-García, University of Alcalá, Spain
 Chairs: Roberto Gómez-García, University of Alcalá, Spain
 Luca Perreggini, University of Pavia, Italy

09:00-09:20	Digital Modeling of Microwave Filters With Coupled-Line Sections <i>José-María Muñoz-Ferreras (University of Alcalá, Spain); Dimitra Psychogiou (University of Colorado Boulder, USA); Roberto Gómez-García (University of Alcalá, Spain)</i>
09:20-09:40	Quasi-Reflectionless Signal-Interference Wide-Band Bandstop Filters <i>Roberto Gómez-García (University of Alcalá, Spain); Li Yang (University of Alcalá, Spain); José-María Muñoz-Ferreras (University of Alcalá, Spain); Wenjie Feng (Nanjing University of Science and Technology, P.R. China)</i>
09:40-10:00	Optimized Design of Compline Filters with Transmission Zeros <i>José Joaquín Vague and Javier Ossorio (Universitat Politècnica de València, Spain); Santiago Cogollos and Vicente Boria (Universidad Politècnica de Valencia, Spain); Marco Guglielmi (University of Valencia, Spain)</i>
10:00-10:20	Systematic procedure for the efficient design of folded waveguide comb-line filters <i>Angel-Antonio San-Blas (University of Elche, Spain); Jordi Pérez-Guijarro (Miguel Hernández University of Elche, Spain); Vicente Boria (Universidad Politècnica de Valencia, Spain); Marco Guglielmi (University of Valencia, Spain)</i>

Multiscale and Multiphysics Modeling in Photonics - II

Wednesday, May 29, 10:40 - 12:00

Wednesday

Organizer: Alexander V. Kildishev, Purdue University, USA

Chairs: Lucie Prokopeva, Purdue University, USA

Wei E. I. Sha, Zhejiang Univesrity, China

10:40-11:00	Designing Manufacturable Photonic and Plasmonic Structures using Topology Optimization <i>Rasmus Christiansen and Ole Sigmund (Technical University of Denmark, Denmark)</i>
11:00-11:20	Adjoint-based Parallel-in-time Optimization for Electromagnetics: From Source Inversion to Optimal Design <i>Denis Ridzal and Bart van Bloemen Waanders (Sandia National Labs, USA); Eric Cyr (Sandia National Labs, USA)</i>
11:20-11:40	Mixed-Element Discontinuous Galerkin Time Domain Method for Computational Photonics <i>Huaguang Bao and Sawyer D Campbell (The Pennsylvania State University, USA); Pingjuan Werner and Douglas H Werner (Pennsylvania State University, USA)</i>
11:40-12:00	Modeling strain-optical coupling in flexible photonic and metasurface devices <i>Juejun Hu (MIT, USA)</i>

New Techniques of Modeling and Optimization of Microwave Filters - II

Wednesday, May 29, 10:40 - 12:00

Organizers: Dimitra Psychogiou, University of Colorado Boulder, USA
 Roberto Gómez-García, University of Alcalá, Spain
 Chairs: Roberto Gómez-García, University of Alcalá, Spain
 Luca Perregrini, University of Pavia, Italy

10:40-11:00	Comparison of Compact Reduced Basis Method with Different Model Order Reduction Techniques <i>Valentin de la Rubia (Universidad Politecnica de Madrid, Spain); Michal Mrozowski (IEEE, USA); Grzegorz Fotyga (Gdansk University of Technology, Poland); Damian Szypulski (Gdansk University of Technology, Poland)</i>
11:00-11:20	A New Multipactor Effect Model for Dielectric-Loaded Rectangular Waveguides <i>Andres Berenguer Alonso (Miguel Hernandez University of Elche, Spain); Angela Coves (Universidad Miguel Hernández de Elche, Spain); Francisco Mesa (University of Seville, Spain); Enrique Bronchalo (Universidad Miguel Hernandez de Elche (UMH), Spain); Benito Gimeno (Universidad de Valencia, Spain)</i>
11:20-11:40	Miniaturized SIW Filters Based on Shielded Quarter-Mode Cavities <i>Nicolò Delmonte, Maurizio Bozzi and Luca Perregrini (University of Pavia, Italy); Cristiano Tomassoni (University of Perugia, Italy)</i>
11:40-12:00	A Dualband Coupling Matrix Method for Designing Quad-channel Diplexer <i>Xiaolin Fan and Song Li (University of Regina, Canada)</i>

Modeling and Design Methods for Advanced Applications

Wednesday, May 29, 10:40 - 12:00

Wednesday

Chairs: Liang Zhou, Shanghai Jiao Tong University, China
Wenchao Chen, Zhejiang University, China

Prediction of Radiation by Shielded Circuit Modules in a Cabinet Using Near Field-Based Equivalent Model

Huapeng Zhao (University of Electronic Science and Technology of China, P.R. China)

Study of Multispectral Temperature Measurement Technique for Laser Damage

Qin Yalou (University of Electronic Science and Technology of China, P.R. China); Li Wei, Yang Chunping and Wei Yanbin (University of Electronic Science and Technology of China); Zhenming Peng (University of Electronic Science and Technology, P.R. China)

The Challenges for the Simulation of Smartphone Radiated Spurious Emissions

Xin Fu, Cheng Sun, Yi HE, Jing Zhou, Nan Xia, Zhengdong Gu and Decao Yang (Huawei Technologies Co. Ltd. Shanghai, P.R. China)

Analysis of High-Order Small Perturbation Method for Scattering from 1-D Conducting Rough Surface

Qing Wang, Shan Jiang, Jian-Qiang Hou and Zhen-Ya Lei (Xidian University, P.R. China)

Simulation of Thermal Effect of Carbon Fiber Target Material Irradiated by Laser

Yanbin Wei, Yang Chunping, Li Wei and Qin Yalou (University of Electronic Science and Technology of China, P.R. China)

Spectral Domain Modeling of Superconducting Slotline using an Oblique Applied Static Magnetic Field

Jolly Andrews (Christ College (Autonomous), Irinjalakuda, India); Vincent Mathew (Central University of Kerala, India)

Acceleration Method for DGTD Algorithm on Sunway TaihuLight Platform

Lei Zhao (Jiangsu Normal University, P.R. China)

Bayesian Global Optimization of Expensive, Strongly Non-stationary, Black-box Functions

Sudharshan Renganathan (Georgia Institute of Technology, USA)

CNTFET Sim: Design a Simulator for Modeling of Carbon Nanotube Field-Effect Transistor

Soheli Farhana (MIIT, UniKL, Malaysia)

Microwave and Millimeter-wave Near-field Imaging: Applications, Methods and Challenges

Prof. Natalia K Nikolova, *McMaster University*.
 Wednesday, May 29, 13:20-14:00

Abstract - In the last decade, we have witnessed dramatic decrease in the price and size of high-frequency electronics along with the increased functionality of on-chip transceivers and radars. This has spurred unprecedented growth in imaging, sensing and detection applications, which define the current and future growth of wireless technology. We will introduce the methods of microwave and millimeter-wave imaging, which allow to “see” inside optically opaque objects. The electromagnetic models of wave propagation that link the object’s electrical properties to the microwave measurements are briefly introduced with an emphasis on the approximations, which enable real-time image reconstruction. We will discuss the possible detrimental effects of these approximations on the reconstructed images and how these effects can be mitigated through the careful design of the acquisition apparatus and through data processing. We will briefly dive into the inner workings of two reconstruction methods, namely, microwave holography and the scattered-power mapping, along with examples of quantitative image reconstruction of complex dielectric objects.



Natalia K Nikolova (IEEE S’93–M’97–SM’05–F’11) received the Dipl. Eng. (Radioelectronics) degree from the Technical University of Varna, Bulgaria, in 1989, and the Ph.D. degree from the University of Electro-Communications, Tokyo, Japan, in 1997. From 1998 to 1999, she held a Postdoctoral Fellowship of the Natural Sciences and Engineering Research Council of Canada (NSERC) at two Canadian universities, Dalhousie University and McMaster University. In 1999, she joined the Department of Electrical and

Computer Engineering at McMaster University, where she is currently a Professor. Her research interests include inverse scattering, microwave imaging, as well as computer-aided analysis and design of high-frequency structures and antennas. Prof. Nikolova has authored more than 260 refereed manuscripts, 5 book chapters, and the book “Introduction to Microwave Imaging” published by Cambridge University Press in 2017. She has delivered 47 invited lectures around the world on the subjects of microwave imaging and detection as well as computer-aided electromagnetic analysis and design.

Prof. Nikolova is a Canada Research Chair in High-frequency Electromagnetics. She is a Fellow of the IEEE and a Fellow of the Canadian Academy of Engineering (CAE). She served as an IEEE Distinguished Microwave Lecturer from 2010 to 2013.

Emerging Modeling Concepts and Methods - I

Wednesday, May 29, 14:00 - 15:40

Wednesday

Organizer: Zhizhang (David) Chen, Dalhousie University, Canada
 Chairs: Zhizhang (David) Chen, Dalhousie University, Canada
 Ke-Li Wu, The Chinese University of Hong Kong, Hong Kong

14:00-14:20	Derived Full-wave Micro-modeling Circuit for Signal Integrity Analysis <i>Yuhang Dou and Ke-Li Wu (The Chinese University of Hong Kong, Hong Kong)</i>
14:20-14:40	An Edge-based Smoothed FEM for Accurate High-Speed Interconnect Modeling <i>Yangfan Zhang, Shunchuan Yang and Donglin Su (Beihang University, P.R. China)</i>
14:40-15:00	Systematic evaluation of scaled and sub-cellular FDTD models of thin conductive sheets for electromagnetic and multiphysics problems <i>Malgorzata Celuch (QWED, Poland); Marzena Olszewska-Placha (QWED Sp. z o. o., Poland); Konrad Wilczynski (Warsaw University of Technology, Poland)</i>
15:00-15:20	Accurate Symmetric Positive Semidefinite FDTD Subgridding Algorithm for 3-D Problems <i>Kaiyuan Zeng and Dan Jiao (Purdue University, USA)</i>
15:20-15:40	Assessment of a Time Domain Beam Propagation Algorithm Based on Faber Polynomial Expansions <i>Hendrik Kleene and Dirk Schulz (TU Dortmund University, Germany)</i>

Multiphysics Modeling Methods and Applications – I

Wednesday, May 29, 14:00 - 15:40

Chairs: Carlos Salazar-Lazaro, University of Illinois, Urbana-Champaign
Ze Sun, Missouri University of Science and Technology

14:00-14:20	Multiphysics Simulation of Multifilamentary Conduction Resistive Random Access Memory <i>Hao Xie, Wenchao Chen, Shuo Zhang, Guodong Zhu, Jun Hu and Wenyan Yin (Zhejiang University, P.R. China)</i>
14:20-14:40	Monte Carlo Particle Simulation for Electrical and Thermal Analysis of a MESFET using the Finite-Element Approach <i>Ze Sun, Nicholas Erickson, and Jingdong Sun (Missouri University of Science and Technology, USA); Ryan From (The Boeing Company, USA); Jun Fan (Missouri University of Science and Technology, USA)</i>
14:40-15:00	Highspeed Broadband Optical Modulation with Small Footprint Symmetrical IMI Graphene Hybrid Plasmonic Waveguide <i>Md. Shah Alam (Bangladesh University of Engineering and Technology, Bangladesh); Rakib Hasan and Asiful Islam (BUET, Bangladesh)</i>
15:00-15:20	Parallel Modeling Fully Coupled Multiphysics Process in Resistive Random Access Memory Array <i>Dawei Wang and Wenyan Yin (Zhejiang University, P.R. China); Wen-Sheng Zhao (Hangzhou Dianzi University, P.R. China); Wenchao Chen (Zhejiang University, P.R. China)</i>
15:20-15:40	An Efficient Parallel ADI Algorithm for Transient Thermal Simulation of Integrated Packages with Parallel Cyclic Reduction <i>Min Tang, Junfa Mao and Xin Jiang (Shanghai Jiao Tong University, P.R. China)</i>

Student Paper Competition

Wednesday, May 29, 14:00 - 15:40

Chair: Saad Omar, Schlumberger-Doll Research

Assessment of a Time Domain Beam Propagation Algorithm Based on Faber Polynomial Expansions

Hendrik Kleene and Dirk Schulz (TU Dortmund University, Germany)

A Global Approach for Multipactor Discharge

Moiz Siddiqi and Rami Kishek (University of Maryland, USA)

Physics-Based Modeling and Electromagnetic Scattering Computation for Snow-Packs

Mostafa Zaky and Kamal Sarabandi (Univ. Michigan, USA)

Monte Carlo Particle Simulation for Electrical and Thermal Analysis of a MESFET using the Finite-Element Approach

Ze Sun, Nicholas Erickson, Jingdong Sun (Missouri University of Science and Technology, USA); Ryan From (The Boeing Company, USA); Jun Fan (Missouri Univ. of Sci. and Tech.)

Performance Comparison Between Si and Ge pDG-FETs for Different Channel Lengths Based on Hole Transport Simulation

Shuo Zhang, Wenchao Chen, Hao Xie and Afshan Khaliq (Zhejiang University, P.R. China); Liang Zhou (Shanghai Jiao Tong University); Wenyan Yin (Zhejiang University, P.R. China)

Tucker-Enhanced VoxHenry Simulator for Inductance Extraction of Voxelized Conducting/Superconducting Structures

Mingyu Wang, Cheng Qian, and Abdulkadir C Yucel, (Nanyang Technological University, Singapore) Vladimir Okhmatovski; Shucheng Zheng and Zhuotong Chen (Univ. of Manitoba, Canada); Luis J Gomez (Duke Univ., USA); Enrico Di Lorenzo (FastFieldSolvers S. R. L., Italy)

Physics-Informed Deep Neural Networks for Transient EM Analysis

Oameed Noakoasteen, Shu Wang and Zhen Peng (University of New Mexico, USA)

Dynamic Waveguiding in Silicon-Integrated Barium Titanate Thin Films

Margaret Duncan, John Ortmann and Alexander Demkov (University of Texas at Austin, USA)

A novel design of a 10-dipole log-periodic antenna with LTE-800 and GSM-900 band rejection

Keyur Mistry and Pavlos Lazaridis (University of Huddersfield, United Kingdom (Great Britain)); Tian Hong Loh (UK, National Physical Laboratory, United Kingdom (Great Britain)); Zaharias D Zaharis (Aristotle University of Thessaloniki, Greece); Ian A Glover (University of Huddersfield, United Kingdom (Great Britain)); Bo Liu (Glyndwr University, United Kingdom (Great Britain))

Exploitation of Electric/Magnetic Wall Boundary Conditions in the Variational Meshless Method

Vincenzo Lombardi, Maurizio Bozzi and Luca Perregrini (University of Pavia, Italy)

Casimir Energy For Perfect Electric Conductors Revisited

Carlos Salazar-Lazaro ((University of Illinois at Urbana-Champaign, USA), Weng Cho Chew (Purdue University), and Michael Stone (University of Illinois at Urbana-Champaign)

Emerging Modeling Concepts and Methods – II

Wednesday, May 29, 16:00 - 17:40

Organizer: Zhizhang (David) Chen, Dalhousie University, Canada
 Chairs: Zhizhang (David) Chen, Dalhousie University, Canada
 Ke-Li Wu, The Chinese University of Hong Kong, Hong Kong

16:00-16:20	In-Depth Analysis of the TRL Calibration Procedure for De-Embedding in Numerical Simulations <i>Ulrich Schumann (Otto-von-Guericke University, Germany); Andreas Jöstingmeier (Otto-von-Guericke University Magdeburg, Germany); Abbas Omar (University of Magdeburg, Germany)</i>
16:20-16:40	Space-time Building Block for Multiscale Transient Electromagnetic Analysis <i>Shu Wang and Zhen Peng (University of New Mexico, USA)</i>
16:40-17:00	H-Matrix Accelerated MoM Solution of Surface-Volume-Surface Electric Field IE For Scattering Problems on Homogenous Dielectric Objects in Multilayered Medium <i>Vladimir Okhmatovski (University of Manitoba & University of Manitoba, Canada); Shucheng Zheng and Reza Gholami (University of Manitoba, Canada)</i>
17:00-17:20	Flexible Electromagnetic Modeling of SMM Setups with FE and FDTD Methods <i>Malgorzata Celuch (QWED, Poland); Marzena Olszewska-Placha (QWED Sp. z o. o., Poland); Arif Gungor, Jasmin Smajic, Juerg Leuthold (ETH Zurich, Switzerland)</i>
17:20-17:40	A Time-Domain Meshless Method without Discretization in Time <i>Junfeng Wang (University of Electronic Science and Technology of China, P.R. China); Zhizhang (David) Chen (Dalhousie University, Canada); Jingcheng Liang and Cheng Peng (University of Electronic Science and Technology of China, P.R. China)</i>

Multiphysics Modeling Methods and Applications – II

Wednesday, May 29, 16:00 - 17:40

Wednesday

Chairs: Carlos Salazar-Lazaro, University of Illinois at Urbana-Champaign
Ze Sun, Missouri University of Science and Technology

16:00-16:20	<p>Casimir Energy For Perfect Electric Conductors Revisited</p> <p><i>Carlos Salazar-Lazaro*</i>, <i>Weng Cho Chew (Purdue University, USA)</i>, and <i>Michael Stone* (*University of Illinois at Urbana-Champaign, USA)</i></p>
16:20-16:40	<p>A Global Approach for Multipactor Discharge</p> <p><i>Moiz Siddiqi and Rami Kishek (University of Maryland, USA)</i></p>
16:40-17:00	<p>Dynamic Waveguiding in Silicon-Integrated Barium Titanate Thin Films</p> <p><i>Margaret Duncan, John Ortmann and Alexander Demkov (University of Texas at Austin, USA)</i></p>
17:00-17:20	<p>Multiphysics Modeling and Simulation of 3-D Cu-Graphene Hybrid Nano-Interconnects</p> <p><i>Shuzhan Sun and Dan Jiao (Purdue University, USA)</i></p>
17:20-17:40	<p>Performance Comparison Between Si and Ge pDG-FETs for Different Channel Lengths Based on Hole Transport Simulation</p> <p><i>Shuo Zhang, Wenchao Chen, Hao Xie and Afshan Khaliq (Zhejiang University, P.R. China); Liang Zhou (Shanghai Jiao Tong University, P.R. China); Wenyan Yin (Zhejiang University, P.R. China)</i></p>

Deterministic Models of Randomness in Electromagnetic Systems

Prof. Steven G. Johnson, *Massachusetts Institute of Technology*.
Thursday, May 30, 08:20-09:00

Abstract - Many types of stochastic phenomena play an important role in electromagnetic phenomena: manufacturing disorder, spontaneous emission, thermal radiation and fluctuations, and even van der Waals or Casimir forces. Directly modeling such effects by an ensemble of random simulations, however, quickly becomes computationally prohibitive. Instead, because normally one is only interested in some form of average effect, there are often methods to directly find the average effect by coupling deterministic simulations with analytical methods. This talk reviews several such techniques, both new and old. A familiar example of this is the use of the local density of states (LDOS) to capture the mean spontaneous emission power of a single particle, but even this method becomes too costly when applied to an ensemble of emitters continuously distributed throughout a fluorescent medium. Instead, there is a class of analytical transformations that can be used to efficiently model the net effect of emitters everywhere in a material, which can be used to accurately calculate fluorescence, near-field thermal radiation, and even fluctuational forces like the Casimir effect. Yet another example of a random effect is computing scattering from manufacturing disorder such as surface roughness in a waveguide, which poses a challenge for direct modeling because of the vast disparity of scales. Perturbative methods such as Born approximations can be used to separate the scales and formulate deterministic calculations of waveguide loss, but standard methods break down at interfaces between high-contrast materials because of field discontinuities that complicate perturbative analysis. Recent approaches have solved this challenge, however, and can be used to predict loss figures of merit for competing waveguide structures and cavity designs. In general, we often find that there are indirect ways to utilize computational modeling tools that are dramatically faster than brute-force replication of reality without sacrificing accuracy.



Steven G. Johnson, Professor of Applied Mathematics and Physics, Massachusetts Institute of Technology.

Thursday

Multispectral Multiphysics Modeling - I

Thursday, May 30, 09:00 - 10:20

Organizers: Pai-Yen Chen (University of Illinois at Chicago, USA)
 Shaolin Liao (Argonne National Laboratory, USA)
 Chairs: Pai-Yen Chen (University of Illinois at Chicago, USA)
 Shaolin Liao (Argonne National Laboratory, USA)

09:00-09:20 Electromagnetic metamaterials: from artificial structures to information processing system
Wei-Xiang Jiang (SEU, P.R. China); Tie Jun Cui (Southeast University, P.R. China)

09:20-09:40 On-chip ZIM-BiC Laser
Yu Peng (Beijing Forestry University, P.R. China); Shaolin Liao (Argonne National Laboratory, USA)

09:40-10:00 Parallel Multiphysics Simulation for Characterizing Performance Degradation of RF Components
Hao-Xuan Zhang and Liang Zhou (Shanghai Jiao Tong University, P.R. China); Zhenguo Zhao (Institute of Applied Physics and Computational Mathematics, P.R. China); Wenyan Yin (Zhejiang University, P.R. China)

10:00-10:20 Physics-Based Modeling and Electromagnetic Scattering Computation for Snow-Packs
Mostafa Zaky (University of Michigan, USA); Kamal Sarabandi (Univ. Michigan, USA)

Inverse Problems for Applications to Biomedicine

Thursday, May 30, 09:00 - 10:20

Organizers: Xudong Chen, National University of Singapore, Singapore
Shaoying Huang, Singapore University of Technology and Design, Singapore

Chairs: Maokun Li, Tsinghua University
Mikhail Kozlov, Max Planck Institute for Human Cognitive and Brain Sciences, Germany

09:00-09:20 Study on a Three-dimensional Joint Inversion Algorithm for Acoustic and Electromagnetic Data
Xiaoqian Song, Maokun Li, Fan Yang and Shenheng Xu (Tsinghua University, P.R. China); Aria Abubakar (Schlumberger-Doll Research, USA)

09:20-09:40 Ultrasound and Microwave Imaging with Prior Property Dependencies
Ian Jeffrey, Joe LoVetri and Max Hughson (University of Manitoba, Canada)

09:40-10:00 Homogeneity of the RF Field in MRI TEM Coils
Abbas Omar (University of Magdeburg, Germany)

10:00-10:20 Influence of a metallic shield on RF-induced heating of a lead with straight and helix wires
Mikhail Kozlov (Max Planck Institute for Human Cognitive and Brain Sciences, Germany); Wolfgang Kainz (CDRH, FDA, USA); Luca Daniel (MIT, USA)

Uncertainty Quantification and Data-Efficient Learning - I

Thursday, May 30, 09:00 - 10:20

Organizer: Zheng Zhang, University of California-Santa Barbara

Chairs: Zheng Zhang, University of California-Santa Barbara
Wim Bogaerts, Ghent University

09:00-09:20 Rapid Yield Optimization of Compact Microwave Couplers By Means Of Variable-Fidelity Response Features
Slawomir Koziel and Adrian Bekasiewicz (Gdansk University of Technology, Poland)

09:20-09:40 Catching Rare Design Failures of Analog and Mixed-Signal Circuits: A Machine Learning Approach
Peng Li (Texas A&M University, USA)

09:40-10:00 Predicting Yield of Photonic Circuits With Wafer-scale Fabrication Variability
Wim Bogaerts (Gent University-IMEC, Belgium); Yufei Xing, Yinghao Ye, Umar Khan and Jiaying Dong (Ghent University - IMEC, Belgium); Joris Geessels and Martin Fiers (Luceda Photonics, Belgium); Domenico Spina (Ghent University, Belgium); Tom Dhaene (Ghent University & IMEC, Belgium)

10:00-10:20 Recent Advancements of Uncertainty Quantification with Non-Gaussian Correlated Process Variations
Chunfeng Cui and Zheng Zhang (UC Santa Barbara, USA)

Multispectral Multiphysics Modeling - II

Thursday, May 30, 10:40 - 12:00

Organizers: Pai-Yen Chen (University of Illinois at Chicago, USA)
Shaolin Liao (Argonne National Laboratory, USA)

Chairs: Pai-Yen Chen (University of Illinois at Chicago, USA)
Shaolin Liao (Argonne National Laboratory, USA)

10:40-11:00 Spectral-domain MOM for Planar Meta-materials of Arbitrary Aperture Wave-guide Array
Shaolin Liao (Argonne National Laboratory, USA)

11:00-11:20 Nonlinear Interference in Multicarrier Wave Packets
Alex Schuchinsky (University of Liverpool, United Kingdom (Great Britain)); Michael B Steer (North Carolina State University, USA)

11:20-11:40 Controlling Leaky-Wave by Parity-Time Symmetric Metasurfaces
Pai-Yen Chen and Liang Zhu (University of Illinois at Chicago, USA)

11:40-12:00 Singularity-Enhanced Sensitivity in PT-Symmetric Telemetric Sensor Systems
Pai-Yen Chen (University of Illinois at Chicago, USA)

Frequency-Domain Methods

Thursday, May 30, 10:40 - 12:00

Chairs: James C. Rautio, SONNET
Su Yan, Howard University

10:40-11:00 Volume Rooftop Basis Functions in Shielded Layered Media
James C. Rautio (Sonnet Softwre, Inc., USA); Matthew Thelen (Sonnet Software, Inc., USA)

11:00-11:20 Exploitation of Electric/Magnetic Wall Boundary Conditions in the Variational Meshless Method
Vincenzo Lombardi, Maurizio Bozzi and Luca Perregrini (University of Pavia, Italy)

11:20-11:40 Numerical Evaluation of Singular and Near-Singular Potential Integrals in Layered Uniaxial Media
Jiefu Chen (University of Houston, USA)

11:40-12:00 All-Frequency Stable Finite-Element Formulation and Application in Electromagnetic Multiscale Problems
Su Yan (Howard University, USA)

Uncertainty Quantification and Data-Efficient Learning - II

Thursday, May 30, 10:40 - 11:20

Organizer: Zheng Zhang, University of California-Santa Barbara

Chairs: Zheng Zhang, University of California-Santa Barbara
Wim Bogaerts, Ghent University

10:40-11:00 Adjoint-Based Sensitivity Analysis for Silicon Photonic Variations
Zhengxing Zhang (MIT, USA); Sally I El-Henawy (Massachusetts Institute of Technology, USA); Allan Sadun (MIT, USA); Ryan Miller (Coventor Inc., USA); Luca Daniel (MIT, USA); Jacob White (Massachusetts Institute of Technology, USA); Duane Boning (MIT, USA)

11:00-11:20 An Adaptive Algorithm for Fully Automated Extraction of Passive Parameterized Macromodels
Stefano Grivet-Talocia, Elisa Fevola, Alessandro Zanco, Tommaso Bradde and Marco De Stefano (Politecnico di Torino, Italy)

Keynote

Thursday, May 30, 11:20 - 12:00

11:20-12:00 Modelling - based methodology for downscaling dielectric resonator material measurements of material surfaces
Prof. Malgorzata Celuch (QWED, Poland)

Industry Panel (Salon 4)

Panel Chair: Dr. Olena (Jianfang) Zhu,
Intel Corporation, USA

Thursday, May 30, 12:00-13:00

Abstract - A group of panelists invited from leading semiconductor, electronic design automation, electromagnetics, microwave, and multiphysics companies will discuss challenges and opportunities related to future technology development in the broad area of NEMO. Lunch will be provided.

Sponsor: Intel Corporation

Panelists:

Dr. Harry Skinner (*Intel Corporation*)

Dr. C. T. Kao (*Cadence*)

Dr. James Rautio (*Sonnet Software, Inc.*)

Dr. CJ Reddy (*Altair Engineering, Inc.*)

Others

Multiphysics Modelling and Simulation: Opportunities, Challenges and Applications

Prof. Wenyan Yin, *Zhejiang University, China.*
Thursday, May 30, 13:20-14:00

Abstract - Multiphysics modelling and simulation methods have been widely adopted in many key areas, such as thermal management of high-power RF devices and transceivers for wireless communication, two- to three-dimensional integrated circuits, new generation memory arrays, and electromagnetic protection of communication & radar systems in aerospace-based platform, *etc.* However, multiphysics modeling and simulation methods, in comparison with single-field simulation, remain a lot of very challenging tasks even with nowadays.

This speech will introduce multiphysics modelling and simulation activities carried out at EIEI of Zhejiang University, China recently. Including multiphysics modeling and simulation at different scales, *i.e.* from nanoscale devices to circuit and chip levels; challenges in the development of algorithms with large-scale parallel simulation capability; and high performance computing (HPC) for multiscale and multiphysics simulation. Also, some typical applications will be addressed for successful multiphysics compatibility design of RF packaging and protection, *etc.*



Wenyan Yin (F'13) received the M. S. degree in electromagnetic fields and microwave techniques from Xidian University, Xi'an, China, in 1989, and the Ph.D. degree in electrical engineering from Xi'an Jiao Tong University, Xi'an, China, in 1994.

From 1993 to 1996, he was an Associate Professor in the Department of Electronic Engineering, Northwestern Polytechnic University (NPU), Xi'an, China. From 1996 to 1998, he was the AvH Research Fellow in the Department of Electronic Engineering, Duisburg University, Germany. From Dec. 1998 to Oct. 2005, he was with the National University of Singapore (NUS), Singapore, as a Research Scientist. From April 2005 to

Dec. 2008, he was a Professor in the School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University (SJTU), Shanghai, China, where he is currently an adjunct Ph.D. candidate supervisor with the Center for Microwave and RF Technologies of SJTU. Since Jan. 2009, he has been with the Zhejiang University (ZJU), Hangzhou, China, as a "Qiu Shi" Distinguished Professor. He is now the director of the Innovative Institute of Electromagnetic Information and Electronic Integration (EIEI), College of Information Science and Electronic Engineering (ISEE) of ZJU. As a Leading author, he has published more than 270 international journal papers (about 180 IEEE papers), including 1 international book and several book chapters. Dr. Yin has been selected as IEEE Fellow in 2013 for contribution of *multiphysics solution to intentional electromagnetic interference and nanostructure electromagnetic compatibility*. He is now the Associate Editor of *IEEE Trans. Components., Packaging, and Manufacturing Technology*, and the Associate Editor of *IEEE Journal of Multiscale and Multiphysics Computational Techniques*.

Prof. Yin received the Science and Technology Progress Award of the First Class from the local Shanghai Government of China in 2005 and 2011, respectively, the National Technology Invention Award of the Second Class from the Chinese Government in 2008, the Science and Technology Progress Award of the Second Class of China in 2012, and several Best Paper Awards of some international conferences.

Emerging Modeling Concepts and Methods - III

Thursday, May 30, 14:00 - 15:40

Organizer: Zhizhang (David) Chen, Dalhousie University, Canada

Chairs: Zhizhang Chen, Dalhousie University

Magorzata Celuch, QWED

14:00-14:20	Recent Advances in EM Centric Multi-Physics Parametric Modeling <i>Feng Feng (Carleton University, Canada); Wei Zhang (Tianjin University, P.R. China); Jianan Zhang (Tianjin University, P.R. China & Carleton University, Canada); Zhihao Zhao (Carleton University & Tianjin University, Canada); Jing Jin (Tianjin University, P.R. China); Qijun Zhang (Carleton University, Canada)</i>
14:20-14:40	Inconsistent polarized quad-port microwave heating with swept frequency <i>Huacheng Zhu, Fengming Yang and Yang Yang (Sichuan UNiversity, P.R. China); Kama Huang (Sichuan University, P.R. China)</i>
14:40-15:00	Wideband Magnetic-Free Non-Reciprocal Devices Based on High-Order Spatio-Temporal Modulation <i>Xiaoguang Liu (University of California, Davis, USA); Xiaohu Wu (UCDavis, USA); Mahmoud Nafe (UC Davis, USA)</i>
15:00-15:20	An Adaptive Method for Interpolating Reduced-Order Models Based on Matching and Continuation of Poles <i>Lihong Feng, Yao Yue and Peter Benner (Max Planck Institute for Dynamics of Complex Technical Systems, Germany)</i>
15:20-15:40	Pre- and Post-Coding in Millimeter-Wave Massive MIMO <i>Abbas Omar (University of Magdeburg, Germany)</i>

Machine Learning Algorithms and Applications in EM-CAD

Thursday, May 30, 14:00 - 15:40

Organizers: Zhen Peng (University of New Mexico, USA)
 Costas Sarris (University of Toronto, Canada)
 Chairs: Zhen Peng (University of New Mexico, USA)
 Costas Sarris (University of Toronto, Canada)

14:00-14:20	Deep Learning Schemes for Solving Full-Wave Nonlinear Inverse Scattering Problems <i>Zhun Wei and Xudong Chen (National University of Singapore, Singapore)</i>
14:20-14:40	Image Reconstruction for Open ECT Sensors using Modular Deep Neural Networks <i>Elizabeth Chen and Costas D Sarris (University of Toronto, Canada)</i>
14:40-15:00	Physics-Informed Deep Neural Networks for Transient Electromagnetic Analysis <i>Oameed Noakoasteen, Shu Wang and Zhen Peng (University of New Mexico, USA)</i>
15:00-15:20	Deep Neural Network Modeling of Microwave Propagation in Enclosed Environments <i>Costas D Sarris, Xingqi Zhang and Aristeidis Seretis (University of Toronto, Canada)</i>
15:20-15:40	Proxy Models via Neural Networks for Borehole Oil-based Mud Imager Inversion Workflows <i>Zikri Bayraktar, Dzevat Omeragic and Yong-Hua Chen (Schlumberger, USA)</i>

Thursday

Computer-Aided Design and Optimization Methods - I

Thursday, May 30, 14:00 - 15:40

Chairs: Natalia Nikolova, McMaster University
Jin Yan, Intel, USA

14:00-14:20	Efficient Equalization Optimization Algorithm for Signaling Analysis in Nonlinear System <i>Jin Yan, Alaeddin Aydiner, Jianfang Zhu and Jun Liao (Intel Corporation, USA); Dmitry Messerman (Intel Corporation, Israel); Alvaro D. Camacho Mora (Intel Corporation, Costa Rica); Dan Jiao and Miaomiao Ma (Purdue University, USA)</i>
14:20-14:40	Expedited Design Optimization of Antenna Input Characteristics Using Trust-Region Search with Adaptive Jacobian Updates <i>Anna Pietrenko-Dabrowska and Slawomir Koziel (Gdansk University of Technology, Poland)</i>
14:40-15:00	Computationally-Efficient and Reliable Surrogate Modeling of Antenna Structures Using Performance-Driven Nested Kriging <i>Slawomir Koziel and Anna Pietrenko-Dabrowska (Gdansk University of Technology, Poland)</i>
15:00-15:20	Low-Cost Analysis of Size-Bandwidth Trade-Offs for Compact Rat-Race Couplers Using Surrogate-Assisted Multi-Objective Optimization <i>Adrian Bekasiewicz and Slawomir Koziel (Gdansk University of Technology, Poland)</i>
15:20-15:40	Design and Manufacture of Jaumann Radar Absorbing Materials Using GA Optimization <i>Amir Galehdar and Andrew Amiet (Defence Science and Technology Group, Australia)</i>

Emerging Modeling Concepts and Methods - IV

Thursday, May 30, 16:00 - 17:40

Organizer: Zhizhang (David) Chen, Dalhousie University, Canada

Chairs: Zhizhang Chen, Dalhousie University

Magorzata Celuch, QWED

16:00-16:20	Method for Analytically Finding the Null Space of Stiffness Matrix for Both Zeroth- and Higher-Order Curl-Conforming Vector Bases <i>Li Xue and Dan Jiao (Purdue University, USA)</i>
16:20-16:40	Analysis of the Low Frequency Transient Magnetic Field form a Coil by Thin Wire Modeling FDTD Method <i>Zheng-Yu Huang (Nanjing University of Aeronautics and Astronautics, P.R. China)</i>
16:40-17:00	Fast Green's Function Evaluation for Method of Moment <i>Shunchuan Yang and Donglin Su (Beihang University, P.R. China)</i>
17:00-17:20	A Stable Meshless Method for Electromagnetic Analysis <i>Xiaoyan Zhang and Liwei Li (East China Jiaotong University, P.R. China); Zhizhang (David) Chen (Dalhousie University, Canada)</i>
17:20-17:40	Polarization Classification Performance Analysis For Phase-Amplitude Method Based On Poincare Sphere <i>Nihat Unal (Tübitak Bilgem İltaren, Turkey); Süleyman Ayazgök (TÜBITAK BILGEM İLTAREN, Turkey)</i>

Analysis and Design of Antennas, Lumped Elements, Passive and Active Devices

Thursday, May 30, 16:00 - 17:40

Chairs: Meghan Galiardi, Sandia National Laboratories
Robert Miotk, Polish Academy of Sciences

16:00-16:20	Investigation of the electrodynamic characteristics of 2.45 GHz microwave plasma sheet source <i>Robert Miotk (Institute of Fluid Flow Machinery & Polish Academy of Sciences, Poland); Mariusz Jasinski (Institute of Fluid Flow Machinery, Polish Academy of Sciences, Poland)</i>
16:20-16:40	Task-specific compressive optical system design through genetic algorithms <i>Meghan Galiardi, Tu-Thach Quach, Gabriel Birch, Charles LaCasse and Amber Dagel (Sandia National Laboratories, USA)</i>
16:40-17:00	A Ku-band Marchand's Balun for Active Doubler in a GaAs Process <i>Jerzy Cuper, Marcin Rytel, Bartłomiej Salski and Pawel Kopyt (Warsaw University of Technology, Poland)</i>
17:00-17:20	Applications of Associated Hermite FDTD Method in Lumped Parameters Modeling <i>Zheng-Yu Huang (Nanjing University of Aeronautics and Astronautics, P.R. China)</i>
17:20-17:40	On the Possibility of Describing Field Variations in Curved Tunnels by Using Modal Approach to the Propagation in Straight Tunnels <i>Yu Huo and Xiaoguang Zhang (China University of Mining and Technology, P.R. China)</i>

Computer-Aided Design and Optimization Methods - II

Thursday, May 30, 16:00 - 17:40

Chairs: Natalia Nikolova, McMaster University, Canada
 Jin Yan, Intel, USA

16:00-16:20	Fast Yield Estimation of Multi-Band Patch Antennas by PC-Kriging <i>Leifur Leifsson and Xiaosong Du (Iowa State University, USA); Slawomir Koziel (Gdansk University of Technology, Poland)</i>
16:20-16:40	MCP Optimizations solutions based on dual VR sensing implementation <i>Diana Gonzalez Soto (Intel Tecnologia de Mexico, Mexico); Felipe Leal-Romo (ITESO - The Jesuit University of Guadalajara & Intel Guadalajara Design Center, Mexico); Carlos Sanchez Ortiz (Intel Corporation, Mexico)</i>
16:40-17:00	Multipin Optimization of Decoupling Capacitors on Segmented Resonant Planes <i>Ihsan Erdin (Carleton University & Celestica Inc., Canada); Ram Achar (Carleton University, Canada)</i>
17:00-17:20	Design of Miniaturized Substrate Integrated Filters Using Aggressive Space Mapping <i>Jorge Martinez (Universitat Politècnica de Valencia & ETSI Telecomunicacion, Spain); Vicente Boria (Universidad Politècnica de Valencia, Spain); Stefano Sirci (Universitat Politècnica de València, Spain)</i>
17:20-17:40	Wideband Antenna Design Based on Theory of Characteristic Modes <i>Jiafeng Zhou (University of Liverpool, United Kingdom (Great Britain))</i>

Thursday

A World of Ubiquitous Data: Computing industry trends and the opportunity they offer the signaling and electromagnetic modeling community

Mr. Sanjiv Soman, *Sr. Director, Client Physical Architecture, Intel Corporation.*
Friday, May 31, 08:20-09:00

Abstract - The computing industry is going through a sea of change. We are at the edge of a new digital revolution where data is going to be ubiquitous. AI, Autonomous driving and the internet of things will drive data consumptions into the realm of terabytes/second and create new usages that we can't yet fully fathom. Data will be like water or electricity... a necessity. While the exact new use cases and the associated problems that they will bring are evolving daily, there are some trends that can point to the types of challenges that the industry will face as we enter this new age.

- Ubiquitous data drives insatiable bandwidth requirements
- Moore's Law shows no sign of slowing down.
- Interface frequencies must scale with Moore's Law to feed the compute engines
- Higher bandwidth requires faster buses and new signaling techniques
- Radios in systems are multiplying – WiFi, LTE, 5G etc.
- Power budgets are decreasing, increasing SNR and challenging high-speed signaling
- Form Factors are going wild making standardization of solutions very challenging
- Compute devices are shrinking, inducing complex interactions between IOs and radios

Some of the most promising areas to explore for solutions will be presented.



Sanjiv C Soman is the Sr. Director of the Client Physical Architecture team within the Client Computing Group at Intel Corporation. His organization has R&D operations in California, Oregon, Costa Rica, Malaysia & India focused on platform and package level architecture, analysis and engineering. Sanjiv joined Intel in 1996 as a validation platform design engineer in Chandler, AZ. Over the years he has held many engineering leadership positions at Intel in fields like VHDL design, validation, Signal Integrity, Power Integrity and Platform Power Delivery. Since 2017 he

has been leading the Client Physical Architecture team, with the charter to make the platform hardware solutions a competitive advantage for Intel, by making it smaller, cheaper and easier to implement while delivering category leading performance and user experiences. Some of his significant achievements were pioneering work on pkg and die level power delivery modeling and analysis, driving signal & power integrity co-simulation methodologies, delivering the first integrated on-package voltage regulator for Intel processors and driving a variety of platform power delivery strategies for Intel. Sanjiv has 3 patents and is a 2017 Intel Achievement Award winner.

Sanjiv has a B.Tech in Electronics and Communications Engineering from the National Institute of Technology, Kozhikode, India and an MS EE from Arizona State.

TUTORIALS and SHORT COURSES (Salon 5)

Friday, May 31, 08:00 - 17:00

For course abstract, objective, and outline, see the website:
<https://nemo-ieee.org/2019/program/tutorials.html>

Chair: Su Yan, Howard University, USA

08:00- 09:30	Broadband Green's Functions for Electromagnetic and Acoustic Wave Scattering <i>Prof. Shurun Tan and Prof. Leung Tsang, University of Michigan</i>
09:30- 11:00	Application of Deep Learning Techniques in Computational Electromagnetics <i>Prof. Maokun Li, Tsinghua University</i>
11:00- 12:30	Scalable Direct Solvers for Electromagnetics and Multiphysics Simulations <i>Dr. Yang Liu and Dr. Pieter Ghysels, Lawrence Berkeley National Laboratory</i>
14:00- 15:30	Spin and Orbital Angular Momenta of Electromagnetic Waves <i>Prof. Wei E. I. Sha, Zhejiang University</i>
15:30- 17:00	Simulation in Complex Wireless Environments <i>Mr. Jason Bommer and Mr. Eldon Staggs, ANSYS</i>

Modeling of Nanophotonics, Nanomaterials, Meta-structures and Their Applications - I

Friday, May 31, 09:00 - 10:20

Organizer: Hualiang Zhang, University of Massachusetts-Lowell

Chairs: Hualiang Zhang, University of Massachusetts-Lowell

Douglas Werner, Pennsylvania State University

09:00-09:20 Topology Optimization of Nonlinear and Metaphotonic Devices
Zin Lin and Xiangdong Liang (MIT, USA); Adi Pick (Technion, Israel); Victor Liu (San Francisco, USA); Marko Loncar (Harvard University, USA); Alejandro Rodriguez (Princeton University, USA); Steven G. Johnson (Massachusetts Institute of Technology, USA)

09:20-09:40 Radiative cooling for enhanced performance and reliability of electronics
Peter Bermel (Purdue University, USA)

09:40-10:00 Multi-objective Optimization Strategies for Nanoantenna Design
Sawyer D Campbell and Eric B Whiting (The Pennsylvania State University, USA); Pingjuan Werner and Douglas H Werner (Pennsylvania State University, USA)

10:00-10:20 Circular Arc Elements in 2D FEM using Transformation Optics
Gian Guido Gentili (Politecnico di Milano, Italy); Giuseppe Pelosi and Stefano Selleri (University of Florence, Italy); Misagh Khosronejad (Politecnico di Milano, Italy)

EM Modeling and Inverse Problems for Oilfield Application I

Friday, May 31, 09:00 - 10:20

Organizer: Saad Omar (Schlumberger-Doll Research, Cambridge, USA)

Chair: Saad Omar (Schlumberger-Doll Research, Cambridge, USA)

09:00-
09:20

Band-Limited Reconstructions in Microwave Imaging

Abbas Omar (University of Magdeburg, Germany)

09:20-
09:40

An Efficient and Accurate Surface Integral Equation Method to Model and Characterize Triaxial Induction Tool Response in Fractured Formation

Hanming Wang (Chevron, USA), Weifeng Huang and Qinghuo Liu (Duke University)

09:40-
10:00

GPU Acceleration for Triaxial Induction Logging Tool Responses in Layered Uniaxial Formation

Shubin Zeng, Han Lu, Xin Fu, and Jiefu Chen (University of Houston, USA)

10:00-
10:20

Electromagnetic Multi-Casing Corrosion Inspection

Saad Omar (Schlumberger-Doll Research, USA); Dzevat Omeragic (Schlumberger, USA)

Modeling of Nanophotonics, Nanomaterials, Meta-structures and Their Applications - II

Friday, May 31, 10:40 - 12:00

Organizer: Hualiang Zhang, University of Massachusetts-Lowell

Chairs: Hualiang Zhang, University of Massachusetts-Lowell

Douglas Werner, Pennsylvania State University

10:40-
11:00

Inverse design of large-area metasurfaces in 2D and 3D

Raphael Pestourie (Harvard Paulson School of Engineering and Applied Sciences & MIT Mathematics, USA); Zin Lin (MIT, USA); Carlos Pérez Arancibia (Pontificia Universidad Catolica de Chile, USA); Steven G. Johnson (Massachusetts Institute of Technology, USA); Federico Capasso (Harvard University, USA); Wonseok Shin (MIT Mathematics, USA)

11:00-
11:20

Dispersion-engineered metasurfaces for rendering lens systems achromatic and diffraction-limited

Wei Ting Chen and Federico Capasso (Harvard University, USA)

11:20-
11:40

Advances in Multi-Physics Modeling for Parallel Finite Element Code Suite ACE3P

Liling Xiao, Lixin Ge, Zenghai Li, Cho-Kuen Ng (SLAC National Accelerator Laboratory, USA)

11:40-
12:00

Study of Quasi-optical Polarizers for the High Power Millimeter Wave System

Donghui Xia, Yizhe Tian and Zhijiang Wang (Huazhong University of Science and Technology, P.R. China)

EM Modeling and Inverse Problems for Oilfield Application II

Friday, May 31, 10:40 - 12:00

Organizer: Saad Omar (Schlumberger-Doll Research, Cambridge, USA)

Chair: Saad Omar (Schlumberger-Doll Research, Cambridge, USA)

10:40-11:00	Robust EM solvers for 3D reservoir characterization and well placement in complex scenarios <i>Niloofar Farnoosh, Dzevat Omeragic, Mikhail Zaslavsky, Vladimir Druskin and Yong-Hua Chen (Schlumberger, USA)</i>
11:00-11:20	Using Trans-Dimensional Markov Chain Monte Carlo Method with Parallel Tempering Technique for Inversion of Ultra-Deep Directional Resistivity Logging-While-Drilling Data <i>Qiuyang Shen (University of Houston, USA); Hanming Wang (Chevron, USA); Yueqin Huang (Cyentech Consulting LLC, USA); Jiefu Chen (University of Houston, USA);</i>
11:20-11:40	2.5-D Modeling Azimuthal Resistivity Measurement While Drilling in Horizontal Wells <i>Hanming Wang (Chevron, USA); Fangzhou Chen and Ji Chen (University of Houston, USA)</i>

Women in NEMO Panel and Networking (Salon 4)

Panel Chair: Prof. Cherry (Wenquan) Che
South China University of Technology, IEEE MTT-S WIE Chair

Friday, May 31, 12:00-13:00

Abstract - A group of women leaders in both academia and industry will discuss with men panelists the challenges women have encountered during their career development, and how to create a more diverse and inclusive environment to better support a woman's career in NEMO related fields. Lunch will be provided.

Sponsors: IEEE MTT-S and AP-S WIE

Panelists:

Prof. Dominique Schreurs (*KU Leuven, Belgium, IEEE MTT-S President*)

Dr. Vida Ilderem (*Intel Corporation, USA*)

Prof. Qijun Zhang (*Carleton University, Canada*)

Prof. Dan Jiao (*Purdue University, USA, IEEE AP-S WIE Chair*)

Others

Applying Voxel-based Fast Methods to Nanophotonics, IC Interconnect, and Fields in MR Imagers

Prof. Jacob White, *Massachusetts Institute of Technology*.
 Friday, May 31, 13:20-14:00

Abstract - Voxel-based 3-D structure generation has become so fast and reliably automatic, it is now the standard for a broad range of applications including medical-imaging-based anatomical reconstruction, 3-D printer model creation, and virtual nanofabrication. Its remarkable speed allows engineers and clinicians to interactively generate and visualize incredibly complicated structures, enabling them to quickly assess manufacturing processes, diagnose diseases, create implants, or even plan surgery. However, if one needs to determine structure-specific electromagnetic fields, that enabling interactivity evaporates. The problem is that general finite- or volume-element-based methods, used in most 3-D field simulators, are too mismatched to the billion-cube geometries produced by voxel-based structure generators, resulting in days-long simulation times. Much faster simulation can be achieved by embracing the voxelization, and computing fields using FFT-accelerated volume integral equation methods (FFT-VIEM), but at a significant loss in algorithmic generality. In this talk we describe the application-specific additions needed to use FFT-VIEM in three different applications: nanophotonics, on-chip interconnect, and MR imaging, to demonstrate both the tremendous speed benefits as well as the substantial development complexities.



Jacob White, Professor of Electrical Engineering & Computer Science, Massachusetts Institute of Technology.

Session FRP.1-I (Salon 4)

Modeling of Biological Effects

Friday, May 31, 14:00 - 14:40

Chairs: Yu Huo, China University of Mining and Technology

14:00-14:20 Optimum Design of Superficial Microwave Hyperthermia Treatment
Giacomo Muntoni, Alessandro Fanti, Matteo Lodi and Giorgio Montisci (University of Cagliari, Italy)

14:20-14:40 Non-linear Multiphysic Numerical Study of Bone Tumor Hyperthermia Using Magnetic Biomaterials
Matteo Lodi (University of Cagliari, Italy); Giuliano Vacca (University of Genova, Italy); Alessandro Fanti, Giacomo Muntoni and Giuseppe Mazzarella (University of Cagliari, Italy)

Session FRP.1-II (Salon 4)

Focus Session on Commercial Tools - I

Friday, May 31, 14:40 - 15:40

Organizers: CJ Reddy (Altair Engineering, USA)
 Qing He (Telligent Design Solution, USA)

Chairs: CJ Reddy (Altair Engineering, USA)
 Qing He (Telligent Design Solution, USA)

14:40-15:00 Multidisciplinary Design Optimization of an Aircraft Radome
Eamon Whalen (Altair Engineering, USA)

15:00-15:20 EMPIRE XPU: Antenna frontend design including environment for Automotive Radar, SATCOM and 5G
Winfried Simon and Andreas Lauer (IMST GmbH, Germany); Andreas Wien (IMST, Germany)

15:20-15:40 Achieving Chip-Package-System High Performance and Reliability
Qing He (Telligent Design Solution, USA)

Fast Algorithms in CEM - I

Friday, May 31, 14:00 - 15:40

Organizers: Vladimir Okhmatovski, University of Manitoba
Abdulkadir C. Yucel, Nanyang Technological University,
Singapore

Chairs: Vladimir Okhmatovski, University of Manitoba
Zheng Zhang, University of California-Santa Barbara

14:00-14:20	Accuracy-Controlled and Rank-Minimized H^2 -Matrix-Matrix Product with Change of Cluster Bases in Linear Complexity <i>Miaomiao Ma and Dan Jiao (Purdue University, USA)</i>
14:20-14:40	Tucker-Enhanced VoxCap Simulator for Electrostatic Analysis of Voxelized Structures <i>Mingyu Wang, Cheng Qian, and Abdulkadir C Yucel (Nanyang Technological University, Singapore)</i>
14:40-15:00	Numerical Simulation on High Temperature Superconducting Wireless Power Transfer System Based on H-formulation <i>Tanyuan Zou (Shanghai Key Laboratory of High Temperature Superconductors, Shanghai University, P.R. China); Ningshan Ma (St. Paul's School, 325 Pleasant Street, Concord, NH 03301, USA); Yixuan Huang (Saint John's Preparatory School, USA)</i>
15:00-15:20	Tensor Train Accelerated MoM Solution of Scattering Problems on Voxelized Grids and Unstructured Meshes <i>Vladimir Okhmatovski (University of Manitoba & University of Manitoba, Canada); Shucheng Zheng (University of Manitoba, Canada); Cheng Qian, Jr. and Abdulkadir C Yucel (Nanyang Technological University, Singapore); Zhuotong Chen (University of Manitoba, Canada)</i>
15:20-15:40	Embedded Domain Decomposition Approach for Analyzing Complex Antenna Structures <i>Jiaqing Lu, Dongwei Li and Wentao Bao (The Ohio State University, USA); Jin-Fa Lee (Ohio State University, USA)</i>

Focus Session on Commercial Tools - II

Friday, May 31, 16:00 - 17:40

Organizers: CJ Reddy (Altair Engineering, USA)
 Qing He (Telligent Design Solution, USA)
 Chairs: CJ Reddy (Altair Engineering, USA)
 Qing He (Telligent Design Solution, USA)

16:00-16:20 Streamlining User Interface With Modern Techniques as Implemented in Sonnet v17
Brian Rautio (Sonnet Software, Inc., USA)

16:20-16:40 Smith-Purcell Emission Simulated with VSim
Diana Monica Cheatham, David Smithe and John Cary (Tech-X Corporation, USA)

16:40-17:00 Simulation of Electrostatic Discharge (ESD) Testing with XFtd
Gregory D Moss (Remcom Inc., USA)

17:00-17:20 Fast and Accurate Electromagnetic Solutions for Complex 3D Structures
Lawrence Der (Cadence Design Systems, USA)

17:00-17:20 A novel design of a 10-dipole log-periodic antenna with LTE-800 and GSM-900 band rejection
Keyur Mistry and Pavlos Lazaridis (University of Huddersfield, United Kingdom (Great Britain)); Tian Hong Loh (UK, National Physical Laboratory, United Kingdom (Great Britain)); Zaharias D Zaharis (Aristotle University of Thessaloniki, Greece); Ian A Glover (University of Huddersfield, United Kingdom (Great Britain)); Bo Liu (Glyndwr University, United Kingdom (Great Britain))

Fast Algorithms in CEM - II

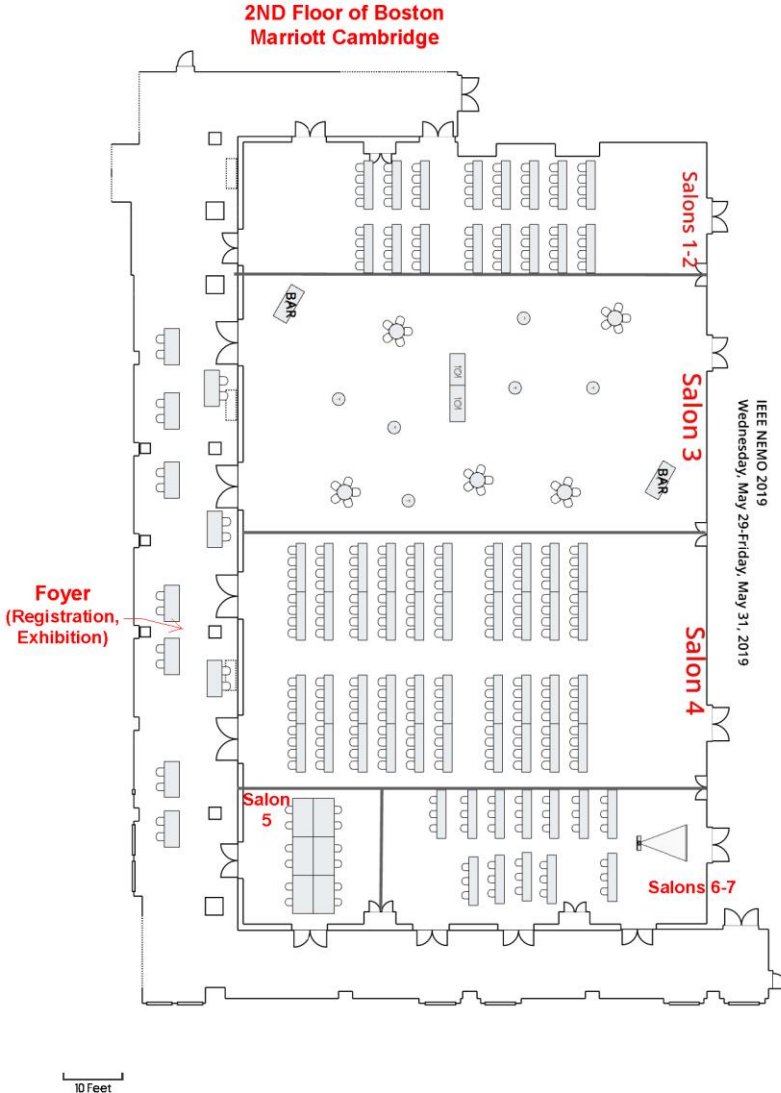
Friday, May 31, 16:00 - 17:40

Chairs: Vladimir Okhmatovski, University of Manitoba
 Zheng Zhang, University of California-Santa Barbara

16:00- 16:20	Tucker-Enhanced VoxHenry Simulator for Inductance Extraction of Voxelized Conducting/Superconducting Structures <i>Abdulkadir C Yucel, Mingyu Wang, Jr. and Cheng Qian, Jr. (Nanyang Technological University, Singapore); Vladimir Okhmatovski (University of Manitoba & University of Manitoba, Canada); Shucheng Zheng and Zhuotong Chen (University of Manitoba, Canada); Luis J Gomez (Duke University, USA); Enrico Di Lorenzo (FastFieldSolvers S. R. L., Italy)</i>
16:20- 16:40	3D Numerical Mode Matching (NMM) Method for Multilayer Metasurfaces <i>Qing Huo Liu (Duke University, USA); Jie Liu and Na Liu (Xiamen University, P.R. China)</i>
16:40- 17:00	Reliable Greedy Multi-point Model Order Reduction for Frequency-dependent Bi-static Radar Cross-section <i>Grzegorz Fotyga (Gdansk University of Technology, Poland); Michal Mrozowski (IEEE, USA); Adam Lamecki (Gdansk University of Technology, Poland)</i>
17:00- 17:20	Second-order Arnoldi Method for Wideband Fast Frequency Sweeps <i>Damian Szypulski (Gdansk University of Technology, Poland); Grzegorz Fotyga (Gdansk University of Technology, Poland)</i>
17:20- 17:40	Model Order Reduction of Quasi-Static S-PEEC Model for 3D Dielectrics Problem <i>Yang Jiang (The Chinese University of Hong Kong, P.R. China); Yuhang Dou and Ke-Li Wu (The Chinese University of Hong Kong, Hong Kong)</i>

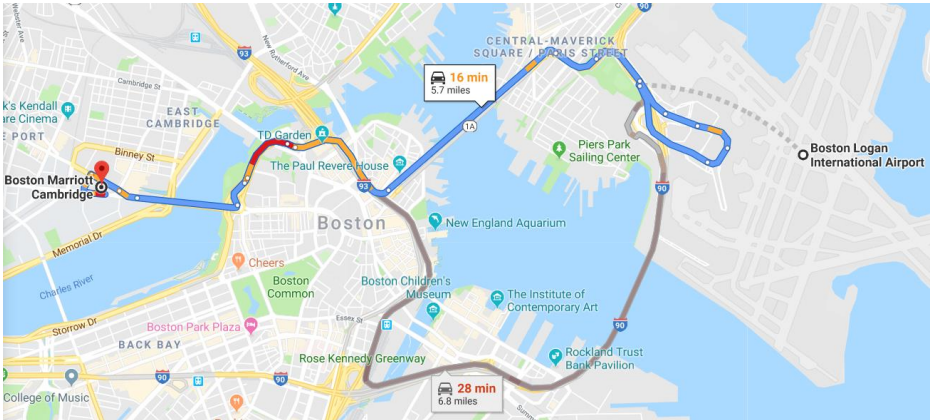
Conference Venue

NEMO2019 will be held in the **Boston Marriott Cambridge** hotel (50 Broadway, Cambridge, Massachusetts 02142 USA). Boston Marriott Cambridge hotel, perfectly located in the lively Kendall Square area, provides easy access to MIT and Harvard University, and is within easy reach of downtown Boston. Right at the Kendall Square/MIT subway station (Red line), and 5 miles to BOS airport.



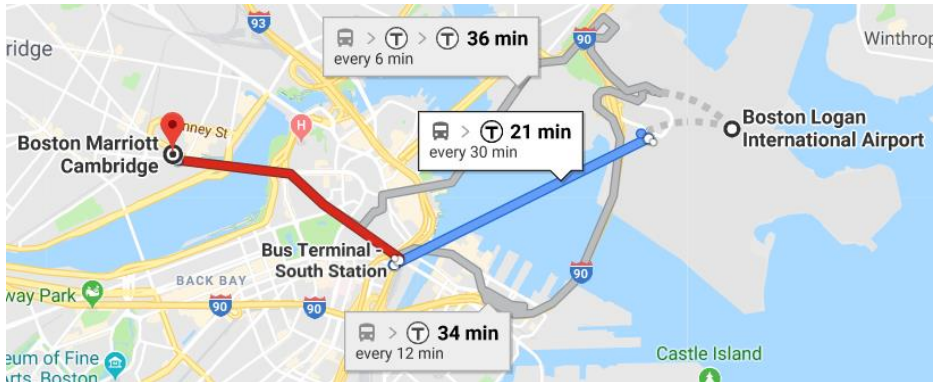
Directions from BOS Airport to Conference Venue

By taxi: 5.7 miles, 16 min, estimated one-way taxi fare 30 USD



By subway: 21 min, estimated one-way cost: shuttle 24 USD + subway 2.75 USD

Directions: Take the airport shuttle (24 USD/adult) to Boston subway station "Bus Terminal - South Station". Take the Boston Red Line (2.75 USD/adult). After 4 stops, take off the subway at "Kendall Square/MIT" subway station. The Boston Marriott Cambridge will be next to you.



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