



# 2022 IEEE MTT-S International Conference on Electromagnetic and Multiphysics Modeling and Optimization (NEMO2022)

July 6-8, 2022, Limoges, France

## Program Overview – DAY 1

<b>July 6th, 2022</b>			
08:45 09:20	<b>Opening Ceremony</b> Amphi 400A		
09:30 10:20	<b>Amphi 400A - Keynote Speech 1: Jacques Sombrin</b> <b>“From Fractal Materials to Fractional Power Function Nonlinear Models for Passive Intermodulation Distortions”</b> In most passive intermodulation (PIM) measurements, PIM power increases with a fractional slope (in dB/dB) as a function of the carrier power. This is in contradiction with classical nonlinear models that predict a small signal integer slope equal to the PIM order, an odd integer. However, most materials that generate PIM are fractal: corrugation, roughness and oxidation of contacts, burrs, fractal ferrite material, ... Their electrical nonlinear behavior should not be reduced to the behavior of the average element and a classical model as is generally done. This conference shows that the electrical nonlinear behavior of a fractal material is different in nature from the electrical nonlinear behavior of its average element. The correct model follows a power law with a fractional exponent that is linked to some fractal dimension of the material. This explains the main characteristic of measurements as the power law exponent is the slope (in dB/dB) observed in measurements. In addition, other characteristics such as unusual power variations and low decrease of PIM power with increasing order have been predicted as direct consequences of this fractional power model and confirmed by new measurements.		
10:20 11:00	<b>Coffee Break (Group Photo)</b>		
	<b>Amphi 400A</b>	<b>Amphi 400B</b>	<b>Amphi 400C</b>
11:00 12:40	<b>Special Session WE1</b> <b>Machine Learning, AI and Uncertainties</b> Chair: F. Canavero Co-Chair: R. Trinchero	<b>Special Session WE2</b> <b>Recent Advances in Metasurface Technologies</b> Chair: O. Yurduseven Co-Chair: T. Fromenteze	<b>Special Session WE3</b> <b>Electromagnetic and Multiphysics Multiscale Modelling and Characterization for Advanced and Efficient Materials – part1</b> Chair: K. Haddadi Co-Chair: M. Celuch
11:00 11:20	<b>WE1.1 - 1570796774</b> <b>Recent Advances in ANN-Based Methods for Yield-Driven Design of EM Structures</b> Jianan Zhang, Qijun Zhang	<b>WE2.1 - 1570796360</b> <b>Space-Time-Coding Digital Metasurfaces and Their Applications</b> Lei Zhang, Vincenzo Galdi, Tie Jun Cui	<b>WE3.1 - 1570796344</b> <b>A New Physics-Based FEM Model for 2D Material FET Design and Analysis Including the Effect of Defectivity</b> Gian Marco Zampa, Davide Mencarelli, Luca Pierantoni
11:20 11:40	<b>WE1.2 - 1570797918</b> <b>An Artificial Neural Network Surrogate Model for Repeater Optimization in the Presence of Parametric Uncertainty for Hybrid Copper-Graphene Interconnect Networks</b> Adeeba Sharif, Sunil Pathania, Suyash Kushwaha, Sourajeet Roy, Rohit Y. Sharma, Brajesh Kaushik	<b>WE2.2 - 1570797464</b> <b>Equivalence Principle-Based Wrapped Active Metasurfaces and their Applications</b> Kayode Adedotun Oyesina, Bo Xue and Alex Wong	<b>WE3.2 - 1570797907</b> <b>MMAMA - Microwave Microscopy for Advanced and Efficient Materials Analysis</b> Kamel Haddadi
11:40 12:00	<b>WE1.3 - 1570797930</b> <b>Deep Gaussian Processes for Microwave Devices Optimization</b> Federico Garbuglia, Domenico Spina, Ivo Couckuyt, Tom Dhaene	<b>WE2.3 - 1570797636</b> <b>Prototyping a Massive Programmable Metasurface: Fabrication and Characterization</b> Ismail Ahmed Bouha, Philipp del Hougne, Matthieu Davy	<b>WE3.3 - 1570798124</b> <b>Simulation-based resonant material measurement technique for precise characterization of LTCC and ULTCC materials towards 5G applications</b> Marzena Olszewska-Placha, Dorota Szwagierczak, Beata Szwabek-Musialska
12:00 12:20	<b>WE1.4 - 1570797947</b> <b>Uncertainty Quantification with Invertible Neural Networks for Signal Integrity Applications</b> Osama Waqar Bhatti, Oluwaseyi Ife Akinwande, Madhavan Swaminathan	<b>WE2.4 - 1570797979</b> <b>Recent Advances in Analytical Model of Waveguide-fed Metasurface Antennas and its Applications to MIMO Systems</b> Insang Yoo, David Smith	<b>WE3.4 - 1570798131</b> <b>Modelling of CPW Structures for the Characterisation of Thin Film Materials</b> Malgorzata Celuch, Konrad Wilczynski, Marzena Olszewska-Placha



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12:20 12:40	<b>WE1.5 - 1570798473</b> <b>Vector-Valued Kernel Ridge Regression for the Modeling of High-Speed Links</b> Nastaran Soleimani, Riccardo Trincherro, Flavio Canavero	<b>WE2.5 - 1570798289</b> <b>Modulated Metasurface Antennas and Beam-formers for mm-waves and Beyond</b> David González-Ovejero, Christos Bilitos, Xavier Morvan, Mauro Ettorre, Ronan Sauleau, Olivier De Sagazan	<b>WE3.5 - 1570798135</b> <b>Modelling Insights into the Recent Assessment of Materials for 5G Applications</b> Marzena Olszewska-Placha, Malgorzata Celuch, Tomasz Karpisz, Bartomiej Salski, Urmi Ray, Say Phommakesone, Michael Hill
<b>12:45 14:15</b>	<b>Lunch</b> <b>IBIS STYLE , 43 Avenue De La Révolution, 87000 Limoges</b>		
<b>14:15 15:05</b>	<b>Amphi 400A - Keynote Speech 2 : Francisco Chinesta</b> <b>“Advanced Technologies Embracing Physics-based and Data-driven Models to Empower EM Simulations”</b> Engineering pre-design needs evaluating multiple scenarios, for different choices of the parameters involved in the physics at hand (material properties, ...), the geometry where the problem is defined, and/or the prescribed boundary conditions. In many cases the high-fidelity solution of the model (with all the parameters given) is time-consuming, and then the exploration of the multi-parametric space becomes unpractical. For efficiently exploring the whole parametric space, the construction of a surrogate (parametric solution) can greatly help, because it allows simulating, optimizing, performing inverse analysis and control, and propagating the uncertainty, all then operating under the stringent real-time constraint. This presentation revisits some recent technologies empowering electromagnetic simulations, by using advanced separated decompositions, nonlinear regularized regressions, manifold learning, and many other technologies in the domain of model order reduction, artificial intelligence and machine learning.		
	<b>Amphi 400A</b>	<b>Amphi 400B</b>	<b>Amphi 400C</b>
<b>15:15 16:35</b>	<b>Regular Session WE4</b> <b>Modeling, Simulation and Design of RF, mm-wave and THz Devices and Circuits – part 1</b> Chair: N. Delhote Co-Chair: R. Gomez-Garcia	<b>Special Session WE5</b> <b>Modeling and Design of Passive Circuits</b> Chair: A. Ghiotto Co-Chair: T-P. Vuong	<b>Regular Session WE6</b> <b>Computational Electromagnetics Algorithms and Applications – part 1</b> Chair: V. Okhmatovski Co-Chair: A. Alvarez-Melcon
15:15 15:35	<b>WE4.1 - 1570796632</b> <b>Optimization Analysis of a Nano-dot Photoconductive Antenna</b> Jitendra Prajapati, Jyothishree Pillai, Deepak Yadav, Madhur D Upadhayay, Naveen Babu	<b>WE5.1 - 1570797338</b> <b>Self-matching Self-compensating Air-filled Substrate Integrated Waveguide (AFSIW) Phase Shifter</b> Nhu-Huan Nguyen, Anthony Ghiotto, Anne Vilcot, Ke Wu, Tan-Phu Vuong	<b>WE6.1 - 1570795841</b> <b>New Numerical Method for Eigenmodes Computation in Ferrite Stripline Cavities with Complex Central Conductor Shape</b> Vincent Olivier, Thierry Monediere, Bertrand Lenoir, Hamza Turki, Laure Huitema
15:35 15:55	<b>WE4.2 - 1570797029</b> <b>Quasi-Elliptic-Type Inline Waveguide Filters With Mutually-Coupled Rotated-Dual-Post Frequency-Variant Coupling Inverters</b> Muhammad Y Sandhu, Adam Lamecki, Roberto Gómez-García, Michal Mrozowski	<b>WE5.2 - 1570798262</b> <b>A Thin-film Resistor Model for Millimeter-wave Wilkinson Power Divider</b> Walid Zahra, Ahmed Moulay, Abdelkader Zerfaine, Tarek Djerafi	<b>WE6.2 - 1570796522</b> <b>Closed-Form Evaluation of Michalski-Zheng's Mixed Potential Green's Function in Unbounded Layered Media Using High-Order DGM-Based SDEAM</b> Xinbo Li, Ian Jeffrey, Vladimir Okhmatovski
15:55 16:15	<b>WE4.3 - 1570797867</b> <b>RF filter design using Deep Learning and Artificial Intelligence</b> Mouatez Bellah Karabaghli, Kamel Frigui, Moctar Mouhamadou, Stéphane Bila, Dominique Baillargeat	<b>WE5.3 - 1570798302</b> <b>Broadband Transition from Microstrip to Slab Air-Filled Substrate Integrated Waveguide (SAFSIW)</b> Nhu-Huan Nguyen, Anthony Ghiotto, Anne Vilcot, Ke Wu, Tan-Phu Vuong	<b>WE6.4 - 1570798296</b> <b>Efficient Calculation of the 3D Rectangular Waveguide Green's Functions Derivatives by the Ewald Method</b> Antonio Huéscar, Fernando D Quesada Pereira, Celia Gomez Molina, Alejandro Alvarez-Melcon, Vicente Boria
16:15 16:35	<b>WE4.4 - 1570798099</b> <b>Reconfigurable Microwave Components Implemented using Field Programmable Microwave Substrate</b> Aarefa Saifee, Christophe Dourousseau,, Aurelien Perigaud, Nicolas Delhote, Fahad Farooqui, Ying Wang, Langis Roy	<b>WE5.4 - 1570799442</b> <b>Overview of Partially Air-Filled Substrate Integrated Waveguide Components</b> Nicolò Delmonte, Lorenzo Silvestri, Anthony Ghiotto, Luca Perreggini, Maurizio Bozzi	
<b>16:35 16:55</b>	<b>Coffee Break</b>		



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	Amphi 400A	Amphi 400B	Amphi 400C
16:55 18:55	<b>Regular/Special Session WE7</b> <b>Multiphysics Modelling and Design of Microwave Circuits and Components</b> Chair: J. Portilla Rubin Co-Chair: R. Sommet	<b>Regular Session WE8</b> <b>Modeling of Inverse Electromagnetic Problems and Design of Metasurfaces</b> Chair: D. González-Ovejero Co-Chair: C. Schulz	<b>Special Session WE9</b> <b>Electromagnetic and Multiphysics Multiscale Modelling and Characterization for Advanced and Efficient Materials -part2</b> Chair: M. Celuch Co-Chair: K. Haddadi
16:55 17:15	<b>WE7.1 - 1570798210</b> <b>Thermal Simulation and Characterization of GaN HEMT using Gate Resistance Thermometry and Thermoreflectance imaging</b> Khalil Karrame, Anass Jakani, N Doua Luc Arnaud kakou Kakou, Christophe Chang, Maggy Colas, Jean-Christophe Nallatamby, Raphael Sommet	<b>WE8.1 - 1570796699</b> <b>Comparative study between different frequency strategies for relative dielectric permittivity and electrical conductivity reconstruction. Application to near subsurface imaging</b> Quentin Didier, Slimane Arhab, Gaëlle Lefeuvre-Mesgouez	<b>WE9.1 - 1570798142</b> <b>Computationally-Efficient Electromagnetic Modelling of High-Q Resonant Structures</b> Bartłomiej Salski, Piotr T. Czekala, Pawel Kopyt
17:15 17:35	<b>WE7.2 - 1570797904</b> <b>HTRB Stress Effects on 0.15 <math>\mu\text{m}</math> AlGaIn/GaN HEMT Performance</b> Vigneshwara Raja, Mohamed Bouslama, Jean-Claude Jacquet, Raphael Sommet, Christophe Chang, Benoit Lambert	<b>WE8.2 - 1570798264</b> <b>A Statistical FDFD Simulator for the Generation of Labeled Training Data Sets in the Context of Humanitarian Demining using GPR</b> Jonas Schorlemer, Jochen Jebramcik, Christoph Baer, Ilona Rolfes, Christian Schulz	<b>WE9.2 - 1570798190</b> <b>Evaluation of the Systematic Error for Scanning Microwave Microscopy Following an In-Situ Broadband Calibration Procedure</b> Matthieu Gaudet, James Mead, Olaf C Haenssler, Sergej Fatikow
17:35 17:55	<b>WE7.3 - 1570798240</b> <b>Variability-aware MMIC Design Through Multiphysics Modelling</b> Simona Donati Guerrieri, Chiara Ramella, Eva Catoggio, Fabrizio Bonani	<b>WE8.3 - 1570797955</b> <b>Surrogate models and machine learning for large-scale meta-optics inverse design</b> Raphael Pestourie, Zhaoyi Li, Youssef Mroueh, Payel Das, Federico Capasso, Steven G. Johnson	<b>WE9.3 - 1570798284</b> <b>Recent Developments in Modelling Software and Microwave Hardware Relevant to the SPDR Imaging of Organic Semiconductors</b> Malgorzata Celuch, Olivier Douhéret, Przemyslaw Korpas, David Moerman, Marzena Olszewska-Placha, Janusz Rudnicki
17:55 18:15	<b>WE7.4 - 1570797746</b> <b>Multi-physics Simulations of Pyroelectric and Thermoelectric Harvesters Based on Nanoscale Ferroelectrics and Graphene Monolayers</b> George Boldeiu, Mircea Dragoman, Martino Aldrigo, Sergiu Iordanescu	<b>WE8.4 - 1570798200</b> <b>Broadband reflecting Luneburg lens beam-former at Ka-band</b> Christos Bilitos, Xavier Morvan, Enrica Martini, Ronan Sauleau, Stefano Maci, David González-Ovejero	<b>WE9.4 - 1570799436</b> <b>Resonant and Non-resonant Magneto-elastic Coupling in Micro/nano Structured Ferromagnetic Thin Films Deposited on Piezoelectric Substrates</b> Abdelkrim Talbi, Aurelien Mazzamurro, Yannick Dusch, Philippe Pernod, Nicolas Tiercelin, Olivier BouMatar
18:15 18:35	<b>WE7.5 - 1570797793</b> <b>EM and Thermo-Mechanical Analysis and Design of a Compact-RFQ</b> Joaquin Portilla, Jorge Feuchtwanger, Iñigo Arredondo, Estibaliz Asua, Victor Etxebarria, Nicolas Vallis, Rafael Enparantza, Iratxe Ariz, Iñigo Muñoz, Unai Etxebeste, Iñaki Hernandez	<b>WE8.5 - 1570798261</b> <b>Near-Field Model for the Computation of Coverage Generated by an IRS: Formulation and Validation</b> Álvaro F. Vaquero, Daniel Martinez-de-Rioja, Eduardo Martinez-de-Rioja, Manuel Arrebola, Jose A. Encinar, Marcos R. Pino	
18:35 18:55	<b>WE7.6 - 1570798294</b> <b>Multiphysics Behaviour of Metal Contacts with Rough Surfaces</b> Amir Dayan, Yi Huang, Alex Schuchinsky		
19:15 21:00	<b>Welcome Reception</b> <b>City Hall of Limoges, Room Longequeue</b>		



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## Program Overview – DAY2

### July 7th, 2022

<p><b>08:30</b> <b>09:20</b></p>	<p style="text-align: center;"><b>Amphi 400A - Keynote Speech 3: Okan Yurduseven</b> <b>“Holographic Metasurfaces: From Antennas to Beyond”</b></p> <p>Metasurfaces are special types of apertures synthesised on a sub-wavelength scale. Combined with holography, such apertures can manipulate electromagnetic (EM) waves to achieve unusual EM phenomena. In this talk, we will discuss holographic metasurface apertures and our research on their applications; from beam-forming as an enabling antenna technology to compressive architectures in computational imaging, channel characterization and wireless communications.</p>
<p><b>09:30</b> <b>10:20</b></p>	<p style="text-align: center;"><b>Amphi 400A - Keynote Speech 4: Dirk de Villiers</b> <b>“Design of Modern Radio Telescope Antennas Using Surrogate Modelling”</b></p> <p>Modern radio telescope antennas are often required to provide extremely high performance, with the definition of the figure of merit to quantify such performance normally being different from standard antenna parameters like gain and sidelobe levels. Some of the most important new telescopes, like the MeerKAT, SKA, and ngVLA systems employ large numbers of medium-size reflector antennas to achieve both the required collecting area, and the required number of baselines for high resolution imaging. A striking implication of such large N systems is that small improvements, of the order of a few percent, in the performance of each individual element may scale the performance/cost of the total system directly. As such, great care is taken in the design phase to get the best possible beams out of the feed and reflector combinations under consideration. This talk will discuss some of the recent surrogate-based modelling and design strategies we have employed over the last decade or so in the design of these reflector antenna systems. It remains clear that the combination of proper physical understanding of the system, coupled with sensible model fitting (and plenty of computer time) remains the gold standard to achieve both excellent performance, as well as confidence that the realised result is very near a global optimum.</p>
<p><b>10:20</b> <b>10:40</b></p>	<p style="text-align: center;"><b>Coffee Break</b></p>
<p><b>11:40</b> <b>12:10</b></p>	<p style="text-align: center;"><b>Amphi 400A - NEMO Industrial Session</b> <b>Chairs : Sébastien Mons, Cyrille Menuhier</b></p> <p style="text-align: center;"><b>KEYSIGHT TECHNOLOGIES EDA: Dr Tom Demuer</b> <b>“Analyzing and optimizing the local oscillator output of an ultra-wide band signal analyser”</b></p> <p>In this talk, we take a look inside Keysight's Signal Analyzer N9042B capable of analyzing 50 GHz signals for 5G, satellite and radar. Keysight's EDA software is used to simulate and analyze a key module inside the N9042B. During the design phase, measurements showed unwanted spikes in the LO output caused by an EMI shield. Insertion of a poly-iron absorber in the cavity of the shield resolved it. We explore if the same results can be achieved with optimizing the location of tuning rods.</p> <p style="text-align: center;"><b>DASSAULT SYSTEMES SE: Dr Hassan CHREIM</b> <b>“Model-Based Radome Design Engineering”</b></p> <p>Radomes are mainly used to protect antennas from damages, for example those at the nose of every aircraft are there to protect the weather radar. Threats that could damage the radomes are mainly unintentional, like lightning strikes or bird strikes. On the other hand, the pressure caused by the cruise speed has also an impact as it causes some deformation on the radome. From an engineering point of view, we have to make sure that despite all those attacks, the radome has to be transparent to the electromagnetic waves. In this presentation, we will show how our tools help with this multi-physics and multi-disciplinary scenario in order to ensure an optimal performance of the antenna under radome.</p> <p style="text-align: center;"><b>MATHWORKS : Mr Gerald Albertini</b> <b>“RF System Modeling with MATLAB”</b></p> <p>This talk shows how to model a MIMO RF receiver with a baseband beamforming algorithm. It considers antenna coupling effects and RF imperfections. The simulation of the system-level model includes the RF receiver baseband beamforming algorithms, RF imperfections, PA and DPD, and the antenna array radiation pattern.</p>
<p><b>12:15</b> <b>14:15</b></p>	<p style="text-align: center;"><b>Lunch</b> <b>IBIS STYLE , 43 Avenue De La Révolution, 87000 Limoges</b></p>



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	Amphi 400A	Amphi 400B	Amphi 400C
14:30 16:10	<b>Regular Session TH1</b> <b>Computational Electromagnetics Algorithms and Applications – part2</b> <b>Chair: G. Andrieu</b> <b>Co-Chair: J-M. Duchamp</b>	<b>Special Session TH2</b> <b>Modelling and Design of Antenna and Networks</b> <b>Chair: R. Gillard</b> <b>Co-Chair: G. Goussetis</b>	<b>Special Session TH3</b> <b>Advanced on TLM Method for Microwave Applications</b> <b>Chair: J-L. Dubard</b> <b>Co-Chair: M. Ney</b>
14:30 14:50	<b>TH1.1 - 1570798323</b> <b>Investigation of Conformal Mappings for the Approximation of Faber Polynomial based Propagators</b> Wladimir Plotnikov, Dirk Schulz	<b>TH2.1 - 1570795785</b> <b>Reflectarray Antenna Direct Optimization Using Surrogate Models with Several Geometrical Degrees of Freedom per Polarization</b> Daniel R. Prado, Jesús López-Fernández, Manuel Arrebola	<b>TH3.1 - 1570796924</b> <b>Recent Advances in the Unstructured Transmission Line Modelling (TLM) Method</b> Ana Vukovic
14:50 15:10	<b>TH1.2 - 1570798329</b> <b>Local Propagators Utilizing Faber Polynomial based Expansions</b> Wladimir Plotnikov, Dirk Schulz	<b>TH2.2 - 1570797764</b> <b>Advanced Optimization of an Isoflux Reflectarray</b> Andrea Guarriello, Renaud Loison, Daniele Bresciani, Hervé Legay, George Goussetis	<b>TH3.2 - 1570798089</b> <b>1.5D Transmission Line Matrix Model to account for skin effects and impedance mismatches in transmission lines</b> Antonella Ragusa, Hugh Sasse, Alistair Duffy
15:10 15:30	<b>TH1.3 - 1570799360</b> <b>Coupling on RF cable outer conductors in diffuse field environments</b> Yoann Berthoud, Jean-Marc Duchamp, Alejandro Niembro-Martin, Emmanuel Dreina, Fabien Ndagijimana	<b>TH2.3 - 1570797792</b> <b>Efficient Estimation of Multibeam Coverage from an Array Fed Reflector</b> Alejandro Baldominos, George Goussetis, Alberto Mengali, Nelson Fonseca	<b>TH3.3 - 1570798095</b> <b>Validation of the Junction Wire Network Model Implemented in the Cylindrical TLM Method</b> Tijana Dimitrijevic, Aleksandar Atanaskovic, Chris Smartt, Jugoslav Joković, Nebojsa Doncov
15:30 15:50	<b>TH1.4 - 1570799683</b> <b>Textile Fabrics Modeling for Conformal FDTD Simulations of Vibrating Intrinsic Reverberation Chambers</b> Florian Mahiddini, Guillaume Andrieu	<b>TH2.4 - 1570798205</b> <b>Coupling Between Feeders of a Multibeam Metasurface Antenna</b> Jean Cavillot, Modeste Bodehou, Christophe Craeye	<b>TH3.4 - 1570798297</b> <b>The Spatial Resolution of Source Reconstruction in Transmission Line Modeling (TLM) using Computational Time Reversal</b> Wolfgang J. R. Hoefer, Zhizhang Chen
15:50 16:10	<b>TH1.5 - 1570799778</b> <b>Alternative Quantum Circuit Implementation for 2D Electromagnetic Wave Simulation with Quasi-PEC Modelling</b> Nicolas Bui, Alain Reineix, Christophe Guiffaut	<b>TH2.5 - 1570799438</b> <b>On the Interest of Accurate Modeling of Finite-size Arrays for Wide-angle Beam-scanning</b> Remy Lamey, Marc Thevenot, Cyrille Menudier, Olivier Maas, Faycel Fezai	<b>TH3.5 - 1570798315</b> <b>Generalized TLM Block Meshing Scheme Based on N-port Network Representation</b> Abdelrahman Abdallah Ijeh, Marylène Cueille, Jean-Lou Dubard, Michel Ney
16:10 16:30	<b>Coffee Break</b>		
16:30 17:20	<p style="text-align: center;"><b>Amphi 400A - Keynote Speech 5: Peter Fritzon</b>  <b>“The OpenModelica Environment and its Use for Development of Digital Twins”</b></p> <p>The industry is currently seeing a rapid development of cyber-physical system products containing integrated software, hardware, and communication components. The increasing system complexity in the automotive and aerospace industries are some examples. The systems that are developed have increasing demands of sustainability, dependability and usability. Moreover, lead time and cost efficiency continue to be essential for industry competitiveness. Extensive use of modeling and simulation - Model-Based Systems Engineering tools - throughout the value chain and system life-cycle is one of the most important ways to effectively target these challenges. Simultaneously there is an increased interest in open source tools that allow more control of tool features and support, and increased cooperation and shared access to knowledge and innovations between organizations.</p> <p>Modelica is a modern, strongly typed, declarative, equation-based, and object-oriented (EOO) language for model-based systems engineering including modeling and simulation of complex cyber-physical systems. Major features are: ease of use, visual design of models with combination of lego-like predefined model building blocks, ability to define model libraries with reusable components, support for modeling and simulation of complex applications involving parts from several application domains, and many more useful facilities. The Modelica language is ideally suited for cyber-physical modeling tasks since it allows integrated modeling of discrete-time (embedded control software) and continuous-time (process dynamics, often for physical hardware). Modelica 3.3 extended the language with clocked synchronous constructs, which are especially well suited to model and integrate physical and digital hardware with model-based software.</p> <p>This talk gives an overview and outlook of the OpenModelica environment – the most complete Modelica open-source tool for modeling, engineering, simulation, and development of systems applications (<a href="http://www.openmodelica.org">www.openmodelica.org</a>), and its usage for sustainable cyber-physical system and digital twin development. Special features are MetaModeling for efficient model transformations, debugging support for equation-based models, support (via OMSimulator) for the Functional Mockup Interface for general tool integration and model export/import between tools, model-based optimization, as well as generation of parallel code for multi-core architectures.</p>		



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	Moreover, also mentioned is recent work to make an OpenModelica based tool chain for developing digital controller software for embedded systems, and in generating embedded controller code for very small target platforms like Arduino Boards with down to 2kbyte memory. This work has been extended in the recent EMPHYSIS project where the FMI standard has been extended into the eFMI standard for embedded systems.
18:00	<i>Departure by bus to the banquet</i>
19:00 23:00	<b>Banquet, Award Ceremony</b> Le Pôle de Lanaud , <a href="https://www.limousine.org/le-pole-de-lanaud.html">https://www.limousine.org/le-pole-de-lanaud.html</a>



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## Program Overview – DAY 3

<b>July 8th, 2022</b>			
08:30 09:20	<p style="text-align: center;"><b>Amphi 400A - Keynote Speech 6: Didier Floriot</b></p> <p><b>“Progress in Heterogenous integration applied to System in Package for MicroWave to MillimeterWave complex Front End”</b></p> <p>Since decades, semiconductor industries have been pushing the level of performances and integration in two different directions: First, at the die level, with the development of complex systems integrating more and more functions, push the concept of SOC. This is directly coming from Moore law or More Moore law followed since decades by this industry. Second, at the assembly or packaging level, with the development of complex systems integrating more and more functions push the concept of SiP which is known as More than Moore strategy. We observed two trends coming from the Semiconductor industry and the Electronic Printed Circuit Board industry, each one having as strategy to develop and optimize their capacity of integration at the limit. In this keynote, we will review the progress bring by Wafer Level Packaging to future architecture transceivers addressing RF to millimeter wave domain and heterogeneous integration.</p>		
09:30 10:20	<p style="text-align: center;"><b>Amphi 400A - Keynote Speech 7: Wissam Saabe</b></p> <p><b>“Improving System Simulation Accuracy with Measurement-based Behavioral Model”</b></p> <p>The fast and ever-increasing demand for high-speed data services has been motivating and leading to define the next generation of telecommunication systems. To take advantage of this opportunity, methods and techniques to design RF and MW subsystems must continue to evolve to meet the requirements that include spectral and energy efficiency and, on the other hand, to reduce costs and time to market. To deal with these challenges, important works have focused on modeling and simulating front-end designs to allow analysis and optimization at a system level. This talk will present a comprehensive methodology to extract a black-box model of a power amplifier for two application examples: the evaluation of linearization techniques and the front-end design of an advanced antenna system.</p>		
10:20 10:40	Coffee Break		
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# 2022 IEEE MTT-S International Conference on Electromagnetic and Multiphysics Modeling and Optimization (NEMO2022)

July 6-8, 2022, Limoges, France

	<b>Amphi 400C</b>	<b>Room 309</b>
10:40 12:00	<b>Special Session FR3</b> <i>AI-Deep Learning for RF Component Design</i> Chair: Q-J. Zhang Co-Chair: F. Feng	<b>Regular Session FR4</b> <i>Modeling, Simulation and Design of RF, mm-wave and THz Devices and Circuits – part 2</i> Chair: Adam Lamecki Co-Chair: Didier Vincent
10:40 11:00	<b>FR3.1 - 1570797454</b> <b>Recent Advances in ANN Model Structure Adaptation Methods for Microwave Modeling</b> Jinyuan Cui, Feng Feng, Qijun Zhang	<b>FR4.1 - 1570795491</b> <b>A First-principle Assessment at Atomistic Scale of Interface Phenomena in Down-scaling Hafnium-based Metal-insulator-metal Diodes</b> Emiliano Laudadio, Martino Aldrigo, Pierluigi Stipa, Luca Pierantoni, Davide Mencarelli, Mircea Dragoman, Mircea Modreanu
11:00 11:20	<b>FR3.2 - 1570797664</b> <b>Low Complexity Parametric Modelling of Microwave Filters Based on Radial Basis Function Neural Network</b> Zhen Zhang, Yang Yu, Jiabin Liu, Fei Shen, Qingsha Cheng	<b>FR4.2 - 1570798125</b> <b>Design of Microwave Components With Shape Deformation</b> Michal Baranowski, Lukasz Balewski, Adam Lamecki, Michal Mrozowski
11:20 11:40	<b>FR3.3 - 1570799416</b> <b>Recent Advances in Wide Range Parametric Modeling</b> Liu Jinchun, Zhiguo Zhang	<b>FR4.3 - 1570799396</b> <b>A Low-Loss Slot-Line Based Balanced Microstrip Common-Mode Isolator</b> Timothee Le Gall, Anthony Ghiotto, Stefan Varault, Gwenael Morvan, Bruno Louis, Gregoire Pillet
11:40 12:00	<b>FR3.4 - 1570799422</b> <b>Recent Advances in Space-Mapping-Based Multiphysics Optimization</b> Yifan Wang	<b>FR4.4 - 1570799405</b> <b>Computing Propagation Constant in Circulator Strip line Structure with Hybrid Modes</b> Didier Vincent, Patrick Ganster
12:10 12:30	<b>Closing Ceremony</b> Amphi 400A	
12:30 14:00	<b>Lunch</b> IBIS STYLE , 43 Avenue De La Révolution, 87000 Limoges	





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## KEYNOTE SPEAKER 1

**Jacques Sombrin**

**TéSA Laboratory, Toulouse, France**

**Biography:** Born on 01/03/ 1949 in Lons (64) France, Engineer X 1969, Télécom Paris 1974, Microwave engineer, then Head of Microwave Department in CNES (French Space Agency) from 1974 to 1998. Head of Transmission and Location Division (55 people) from 1998 to 2003. Senior Expert and Assistant-Director of Radio Frequency Directorate (120 people) from 2003 to 2010. Responsible for the research chair “Integrated and Secure Systems” of LABEX Sigma-Lim at Limoges University from 2013 to 2019. Consulting engineer in Space Telecommunications and researcher in TéSA Laboratory since 2011.

## KEYNOTE SPEAKER 2

**Francisco Chinesta**

**PIMM research laboratory, UMR CNRS - Arts et Métiers Institute of Technology, Paris, France**

**Biography:** Francisco Chinesta is currently full Professor of computational physics at Arts et Métiers Institute of Technology -Paris-, Honorary Fellow of the “Institut Universitaire de France” – IUF- and Fellow of the Spanish Royal Academy of Engineering. He is the president of the ESI Group scientific committee and director of its scientific department. He was (2008-2012) AIRBUS Group chair professor and since 2013 he is ESI Group chair professor on advanced modeling and simulation. He received many scientific awards, among them the IACM - International Association of Computational Mechanics- Zienkiewicz award -New York, 2018- ... He is author of more than 350 papers in peer-reviewed international journals. He was president of the French association of computational mechanics -CSMA- and is director of the CNRS research group -GdR- on model order reduction techniques in engineering sciences, editor and associate editor of many journals. He received many distinctions, among them the Academic Palms, the French Order of Merit, ... in 2018 the Doctorate Honoris Causa at the University of Zaragoza (Spain) and in 2019 the Silver medal from the French CNRS. He is the director of the leading DESCARTES project on Hybrid Artificial Intelligence that the CNRS develops in its hub at Singapore on Intelligent Modelling for Decision Making in Critical Urban Systems.

## KEYNOTE SPEAKER 3

**Okan Yurduseven**

**Queen’s University Belfast, UK**

**Biography:** Okan Yurduseven is currently an Associate Professor at Queen’s University Belfast, UK. His research interests include metamaterials, microwave and millimetre-wave imaging, compressive sensing and wireless power transfer. He has authored more than 150 peer-reviewed technical journal and conference articles in these fields. He has received several awards on research excellence, including the Leverhulme Trust Research Leadership Award (2020, £1M) and the Queen’s University Belfast Vice Chancellor’s Early Career Researcher Prize (2022).

## KEYNOTE SPEAKER 4

**Dirk de Villiers**

**Stellenbosch University, South Africa**

**Biography:** Dirk I.L. de Villiers was born in Langebaan, South Africa, and received the B.Eng and Ph.D. degrees in electrical and electronic engineering from the University of Stellenbosch, Stellenbosch, South Africa in 2004 and 2007 respectively. From 2008 to 2009 he was a post-doctoral fellow at the University of Stellenbosch working on antenna feeds for the South African SKA program. He is currently a Professor at Stellenbosch University, where he holds the SARChI Research Chair in Antenna Systems for SKA. He has been visiting researcher at Antwerp University in Antwerp, Belgium and at Chalmers University of Technology in Gothenburg, Sweden. Since 2010 he has regularly worked on contract for EMSS Antennas (Pty) Ltd in Stellenbosch, South Africa, on the design of the reflector antenna systems for the MeerKAT, SKA, and ngVLA radio telescopes. His main research



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interests include reflector antennas for radio astronomy, as well as surrogate-based optimization of microwave components. He served as chair of the South African IEEE joint AP/MTT/EMC chapter between 2017-2018 and is a senior member of URSI.

### KEYNOTE SPEAKER 5

**Peter Fritzson**

**Linköping University, Sweden**

**Biography:** Peter Fritzson is Professor and research director of the Programming Environment Laboratory, at Linköping University. He is also vice director of the Open Source Modelica Consortium, vice director of the MODPROD center for model-based product development, (previously director of both) organizations he took initiative to establish. During 1999-2007 he served as chairman of the Scandinavian Simulation Society, and secretary of the European simulation organization, EuroSim. During 2000-2020 he was vice Chairman of the Modelica Association.

Prof. Fritzson's current research interests are in software technology, especially programming languages, tools and environments; parallel and multi-core computing; compilers and compiler generators, high level specification and modeling languages with special emphasis on tools for object-oriented modeling and simulation where he is one of the main contributors and founders of the Modelica language. Professor Fritzson has authored or co-authored 320 technical publications, including 21 books/proceedings.

### KEYNOTE SPEAKER 6

**Didier Floriot**

**United Monolithic Semiconductors : Director of Technology Perspectives and Innovation  
& Thales SA : Directorate – Director Hardware – Specific technologies domain**

**Biography:** Didier FLORIOT was graduated from Supélec in 1992 as electrical engineering in Semiconductor Physics . He received his M.S. and Phd from the university of Paris VI in 1993 and 1995. He joined the Thales research & Technology Center and worked on the development of the power InGaP/GaAs HBT technology for Radar Applications and on the integration of this technology inside demonstrators. From 2000 to 2007, he was team leader at Alcatel Thales III-V Lab, a joint research group on III-V opto-microwave devices and power semiconductors. He joint UMS (United Monolithic Semiconductors) in 2007 in charge of technological and product cooperation. Then, he was in charge of the Technology Support Group at UMS in charge of reliability evaluation, technology qualifications, modeling characterizations. He is currently sharing his position in between UMS as Director for Innovation and Thales SA Corporate as Technical Director for Specific Technologies.

### KEYNOTE SPEAKER 7

**Wissam Saabe**

**Amcad Engineering, Limoges, France**

**Biography:** Wissam Saabe received the M.S. degree in high-frequency electronics and optoelectronics from University of Limoges, France, in 2013, and the Ph.D. degree in Information Science and Engineering from the XLIM Research Laboratory, University of Limoges, in 2022. He is currently an application engineer at Amcad Engineering. His research interests are non-linear analysis and behavioral modeling of RF and microwave circuits and subsystems.