

SESSION: S0  
PLENARY SESSION

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**Finite Elements in Microwave Engineering: 1968 to 1992**

*Jon P. Webb*

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**Hybrid Finite Element Methods from 1990 to 2005**

*John L. Volakis*

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SESSION: S1

**MULTI-PHYSICS FEM TECHNIQUES IN THE SIMULATION OF  
SEMICONDUCTOR DEVICES***Organized by: Giovanni Ghione*

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**Finite-Element NEGF Analysis of  
Optoelectronic Devices***X. Zhou, F. Bertazzi, M. Goano, G.  
Ghione, E. Bellotti, F. Dolcini, F. Rossi*

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**Numerical FEM Techniques for the  
Sensitivity Parametric Analysis in  
Electro-Thermal Physics-Based Semi-  
conductor Device Models***F. Bonani, S. Donati Guerrieri, G.  
Ghione*

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**Parallel Deterministic Solution of the  
Boltzmann Transport Equation for  
Semiconductors***K. Rupp, A. Morhammer, T. Grasser, A.  
Jnge*

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**Electrothermal Simulation of Wide-  
Area Power Semiconductor Devices  
During Out-of-SOA Events***A. Irace*

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**A 3D Finite Element Framework for  
Comprehensive Multi-Physics Simu-  
lation of Semiconductor Devices***R. Sacco, A.G. Mauri*

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**Multi-physics Simulations in MEMS***A. Corigliano, A. Ghisi, S. Mariani*

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SESSION: S2

**FEM IN ITALY (PART 1)***Organized by: Antonio Laudani, Alessandro Toscano*

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**Convergence Analysis of a NURBS-Based Boundary Integral Equation Solver***U. Iemma, V. Marchese*

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**Equivalent Polynomial Quadrature for Discontinuous Fields in the Extended Finite Element Method***G. Ventura*

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**Derivatives Computation of FEM Solution by Using RPQ Formulae***S. Coco, A. Laudani*

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**FEM Computation of Current Density and Oersted Field in Real Spin-Torque Driven Magnetization Devices***A. Giordano, G. Finocchio, A. Laudani*

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**Numerical Simulations of Surface Plasmon Polaritons Using FEM***G. Lo Sciuto, G. Capizzi*

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**FEM–NN Tool for the Simulation of Vector-Hysteresis in Magnetic Device***E. Cardelli, A. Faba, A. Laudani, G.M. Lozito, F. Riganti Fulginei, A. Salvini*

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SESSION: S3

**FEM IN ITALY (PART 2)***Organized by: Antonio Laudani, Alessandro Toscano*

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**Applications of Numerical Methods  
in Metamaterials at Microwave Fre-  
quencies***M.Barbuto, F. Bilotti, A.Monti, D.  
Ramaccia, A. Tobia, A. Toscano, S.  
Vellucci*

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**FEM Simulations of Acoustic Meta-  
surfaces***F. Asdrubali, F. Bilotti, P. Gori, C.  
Guattari, A. Monti, D. Ramaccia, A.  
Toscano*

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**Volterra Series for an Iterative Finite  
Element Time Domain Solution of  
Wave Propagation in Nonlinear Me-  
dia***S. Maddio, G. Pelosi, M. Righini, S.  
Selleri*

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**Design of Orthomode Transducers  
Using FEM Software Packages***G. Gentili, R. Nesti*

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**A FEM Aided Approach to Cost-  
Effective Design of Direction Finding  
Asymmetric Arrays***L. Scorrano, L. Dinoi*

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SESSION: S4

**ACCELERATION/PRECONDITIONING TECHNIQUES FOR LARGE PROBLEMS***Organized by: Amir Boag, Balasubramaniam Shanker*

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**Hierarchical Functions for Multiscale Problems***R.D. Graglia, A.F. Peterson, P. Petrini, L. Matekovits*

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**Linear Complexity Direct Finite Element Solvers for General Electromagnetic Forward Analysis and Inverse Design***B. Zhou, D. Jiao*

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**Multilevel Nonuniform-Grid Algorithm for EM Scattering Problems***E.V. Chernokozhin, Y. Brick, G. Lombardi, R.D. Graglia, A. Boag*

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**A Combined Mechanical-Electromagnetic Analysis of Dish Reflector Antennas***D.J. Ludick, D.B. Davidson, M. Venter, G. Venter*

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**Novel Surface-Volume-Surface Electric Field Integral Equation for Solution of Scattering Problems on Penetrable Objects***F. Hosseini, A. Menshov, V. Okhmatovski*

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**Babich's Expansion and the Fast Huygens Sweeping Method for the Helmholtz Equation at High Frequencies***J. Qian, W. Lu, R. Burridge*

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SESSION: S5

**INTEGRAL EQUATION / BEM METHODS***Organized by: Amir Boag, Balasubramaniam Shanker*

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**The Integral Equation MEI revisited***J.M. Rius, A. Heldring, E. Ubeda*

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**Isogeometric Method of Moments  
Analysis for Electric Field Integral  
Equations Using Subdivision Surfaces***J. Li, B. Shanker*

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**Graph Laplacian Based Algorithms  
for Stable Current Discretizations on  
Macro Elements***R. Mitharwal, F.P. Andriulli*

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**From Surface Equivalence Principle  
to Modular Domain Decomposition***F. Muth, H. Schneider*

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**A Novel Mortar Surface Technique  
for Modeling of Multi-Scale Strati-  
fied Composites***Z. Peng*

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SESSION: S6

**ADVANCED FEM AND HYBRID TECHNIQUES (PART1)***Organized by: Branislav Notaroš, Juan Zapata*

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**Second-order Nédélec Curl-Conforming Prism for Finite Element Computations***A. Amor-Martin, L.E. Garcia-Castillo*

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**Analysis of 3D Components by 2D FEM***G. G. Gentili, L. Accatino*

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**Exact Discrete Electromagnetism by Sampling and Interpolation***E. Scholz, S. Lange, T. Eibert*

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**A CAD Method based on Hybrid FEM and Spherical Modes for Direct Domain Decomposition***P. Robustillo, J. Rubio, J. Zapata, J.R. Mosig*

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**Finite Element 1-D Solutions in the Presence of Moving Media***A.Ž. Ilic, S.V. Savic, M.M. Ilic,*

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**Nonrigorous Symmetric Second-Order Absorbing Boundary Condition: Accuracy, Convergence and Possible Improvements***S.V. Savic, A.Ž. Ilic, B.M. Notaro, M.M. Ilic*

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SESSION: S7

**ADVANCED FEM AND HYBRID TECHNIQUES (PART 2)***Organized by: Branislav Notaroš, Juan Zapata*

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**Posidonia: A Tool for HPC and Remote Scientific Simulations***A. Amor-Martin, I. Martinez-Fernandez, L.E. Garcia-Castillo*

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**Evaluation of Galerkin Interactions between Surface or Volumetric Elements***J. Rivero, F. Vipiana, D. R. Wilton, W. A. Johnson*

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**FEM-BCI: a Set of Hybrid Methods for the Computation of Electromagnetic Fields in Open Boundaries***G. Aiello, S. Alfonzetti, N. Salerno*

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**The Efficient Mixed FEM with Mass-Lumping and Impedance Transmission Boundary Condition for Computing Optical Waveguide Modes***N. Liu, G. Cai, Q.H. Liu*

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**A New 3D DGTD Method Hybridizing the Finite Element and Finite Difference Techniques with Non-Conformal Meshes***Q. Sun, Q. Ren, Q. Zhan, Q.H. Liu*

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**Multiscale Finite Element Modeling for Composite Material Characterization***B.-Y. Wu, X.-Q. Sheng, Y. Hao*

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SESSION: S8  
**PARALLEL COMPUTATION ON MULTI- AND MANY-CORE  
COMPUTERS**

*Organized by: Ali E. Yilmaz*

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**Parallel Wideband ACE-FMM for  
Large-Scale Distributed-Memory  
Clusters**

*S. Hughey, H.M. Aktulga, B. Shanker*

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**A Parallel, Distributed-Memory  
MLFMA for the Stochastic Galerkin  
Method**

*Z. Zubac, J. Fostier, D. De Zutter, D.  
Vande Ginste*

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**Fast Scalable Parallel Direct Solu-  
tions to Surface Integral Equations in  
Computational Electromagnetics**

*B.M. Notarosh, A.B. Manic, X.S. Li, F.-H.  
Rouet*

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**Parallel MLFMA Accelerated  
Higher-Order Solution of Large Scat-  
tering Problems via Locally Cor-  
rected Nystrom Discretization of  
CFIE**

*M. Shafieipour, I. Jeffrey, J. Aronsson, V.  
Okhmatovski*

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**High-Performance Surface Integral  
Equation Solver for Extreme Large  
Multi-Scale Electromagnetic Prob-  
lems**

*Z. Peng, B. MacKie-Mason*

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**An Empirical Methodology for Judg-  
ing the Performance of Parallel Algo-  
rithms on Heterogeneous Clusters**

*J.W. Massey, A. Menshov, A.E. Yilmaz*

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SESSION: S9

**OPTIMIZATION TECHNIQUES AND PARAMETER SPACE SWEEP***Organized by: Romanus Dyczij-Edlinger*

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**Reduced Basis Model Reduction for Time-Harmonic Maxwell's Equations with Stochastic Coefficients***M. Hess, P. Benner*

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**Adaptive Model-Order Reduction for the Simulation of Devices Fed by Dispersive Waveguides Based on the Finite-Element Scattering Formulation***R. Baltes, A. Sommer, O. Farle, R. Dyczij-Edlinger*

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**Reduced-Basis Method for Geometric Parameters in Computer-Aided Design of Microwave Filters and Diplexers***V. de la Rubia, A. Lamecki, M. Mrozowski*

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**Mesh Deformation Techniques in Parametric Modeling and Numerical Optimization of High Frequency Devices.***A. Lamecki, L. Balewski, M. Mrozowski*

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**Proper Generalized Decomposition Method Applied to Solve 3D Low Frequency Electromagnetic Field Problems***T. Henneron, S. Clénet*

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**Robust, Efficient and Accurate Computation of Nonlinear Eigenvalue Problems from Maxwell equations***M. Eller, S. Reitzinger, S. Schop, S. Zaglmayr*

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SESSION: S10  
**FEM APPLICATIONS**

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**Anisotropic Material Modeling in FEKO with Hybrid FEM/MoM**

*E.A. Attardo, M. Bingle, U. Jakobus*

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**Design, Finite Element Analysis and Fabrication of a 3D Periodic Structure to Read the Temperature of the Objects in Microwave Cavities**

*A. Bostani*

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**Study of the Proximity Effect and the Distribution Parameters of Multi-conductor Transmission Line**

*L. Guizhen, G. Qingxin, Y. Hongcheng, L. Zengrui*

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**Finite Element Modelling of Liquid Crystal-Based Microwave Devices**

*F. Anbal Fernandez, R. James, L. Seddon, S.E. Day, D. Mirshekar-Syahkal*

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**The Finite Element Method for 2400 MHz Cylindrical Waveguide Antenna Modeling**

*E. El Kennassi, K.I. Janati, A. Dirhar, L. Bousshine*

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**A Proposal of Electromagnetic Field Analysis Method for Airport Surface in VHF Band**

*R. Kato, R. Suga, A. Kezuka, O. Hashimoto*

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SESSION: S11

## DOMAIN DECOMPOSITION AND NON-LINEAR FEM

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**Combined Domain Decomposition  
and Model Order Reduction to  
Solve Complex RF Problems Using  
FEniCS**

*T. Flisgen, Johann Heller, Ursula van  
Rienen*

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**A Spurious-Mode Free Jacobi-  
Davidson Method Combined with  
Domain Decomposition for the  
Modal Analysis of Electromagnetic  
Structures**

*O. Floch, R. Baltes, A. Sommer, R.  
DyczijEdlinger*

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**Efficient FEM Software Package In-  
tegration with Evolutionary Algo-  
rithms for Large Electromagnetic  
Problems**

*E. Agastra, A. Lala, B. Kamo, L.  
Ntibarikure*

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**FEM-Based Optimization of Dummy  
Loads for High-power Wideband Mi-  
crowave Calorimeters**

*V.Yu. Kozhevnikov, A.I. Klimov*

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**Localized Diffusive Source Esti-  
mation via an Hybrid Finite Ele-  
ment/Kalman Filtering Approach**

*G. Battistelli, L. Chisci, N. Forti, G.  
Pelosi, S. Selleri*

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**Coupled Discontinuous Galerkin  
Time-Domain Simulation of the Non-  
linear Electromagnetic-Plasma Inter-  
action**

*S. Yan, J.-M. Jin*

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SESSION: S12  
FEM THEORY

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**Structured Meshes Using Computed Basis Functions***M. Nazari, J.P. Webb*

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**On the Preconditioning of the Differential  $A-\Phi$  Formulation***Y.-L. Li, S. Sun, W.C. Chew, L.J. Jiang*

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**Impact of Causality on Computational Techniques***T.K. Sarkar, M. Salazar-Palma*

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**Accurate and Efficient Nyström Volume Integral Equation Method for the Maxwell Equations for Multiple 3-D Scatterers for Meta-Material Applications***W. Cai*

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**Modeling the Ion-Exchange Process for Diffusion Waveguides Within Thin Glass Sheets***T. Kühler, D. Zhang, E. Griese*

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**Multiphysics Simulation of Integrated Circuits with the Finite Element Method***T. Lu, J.-M. Jin*

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