



☒ Technical Sessions

MM_O1

Numerical Techniques 1

Session Date	June 3 (Mon.), 2024
Session Time	10:20-12:00
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Jiefu Chen (University of Houston, USA) Prof. Yanhui Gao (Oita University, Japan)

MM_O1_01

10:20–10:40

■ Efficient Shape Uncertainty Quantification for the TESLA Cavity

David Ebert¹, Anna Ziegler², Jürgen Dölz¹, and Sebastian Schöps²

¹*University of Bonn, Germany*, ²*Darmstadt University of Technology, Germany*

MM_O1_02

10:40–11:00

■ Magnetodynamic and Thermal Homogenisation of Foil Windings for Magnetic Components

Ruth V. Sabariego¹, Wilmar Martinez¹, Patrick Kuo-Peng², and Johan Gyselinck³

¹*KU Leuven, Belgium*, ²*Federal University of Santa Catarina, Brazil*, ³*Free University of Brussels, Belgium*

MM_O1_03

11:00–11:20

■ Model Order Reduction of Cage Induction Motor with Stator and Rotor Failures Based on Multiport Cauer Ladder Network Method

Yuta Takenaka¹, Hiroki Maruyama¹, Yasuhito Takahashi¹, Koji Fujiwara¹, Kengo Sugahara², and Tetsuji Matsuo³

¹*Doshisha University, Japan*, ²*Kindai University, Japan*, ³*Kyoto University, Japan*

MM_O1_04

11:20–11:40

■ Effective Material and Static Magnetic Field for the 2D/1D-Problem of Laminated Electrical Machines

Karl Hollaus, Valentin Hanser, and Markus Schöbinger

Institute of Analysis and Scientific Computing Vienna University of Technology, Austria

MM_O1_05

11:40–12:00

■ s-Domain FE Analysis of Magnetoquasistatic Field Coupled to External Electric Circuit

Cheng Chi, Fan Yang, Yisha Xia, Hui Jiang, and Pengbo Wang

Chongqing University, China

MM_O2

**Static and Quasi-
Static Fields 1**

Session Date	June 3 (Mon.), 2024
Session Time	10:20-12:00
Session Room	Room 2 (Samda B)
Session Chair(s)	Prof. Narayan Kar (University of Windsor, Canada) Prof. Alessandro Formisano (University of Campania Luigi Vanvitelli, Italy)

MM_O2_01

10:20-10:40

■ Implementation of an Anisotropic Magnetic Model Based on the Effective Field in a Finite Element Model

Floran Martin¹, Ruiying Chen², Julien Taurines¹, and Anouar Belahcen¹

¹Aalto University, Finland, ²Hebei University of Technology, China

MM_O2_02

10:40-11:00

■ Fixed-Point Cauer Ladder Network Method for Eddy-Current Problems with Hysteresis

Kengo Sugahara¹, Miwa Tobita², Tetsuji Matsuo², and Yasuhito Takahashi³

¹Kindai University, Japan, ²Kyoto University, Japan, ³Doshisha University, Japan

MM_O2_03

11:00-11:20

■ The Harmonic-Balanced Finite Element Method Coupled with Dynamic Hysteresis Model

Shengze Gao¹, Xiaojun Zhao¹, Yanhui Gao², Lanrong Liu³, Kazuhiro Muramatsu⁴, Takashi Todaka², Yongsheng Xu⁵, and Mingli Fu⁵

¹North China Electric Power University, China, ²Oita University, Japan, ³Hebei Provincial Key Laboratory of Electromagnetic and Structural Performance of Power Transmission and Transformation Equipment, China,

⁴Saga University, Japan, ⁵Electric Power Research Institute of China Southern Power Grid, China

MM_O2_04

11:20-11:40

■ Foil Winding Homogenization with Consideration of Capacitive Effects

Jonas Bundschuh, Yvonne Späck-Leigsnering, and Herbert De Gersem

Darmstadt University of Technology, Germany

MM_O2_05

11:40-12:00

■ Estimation of Condition Number of Quasi-Static Darwin Model

Shingo Hiruma, Takeshi Mifune, and Tetsuji Matsuo

Kyoto University, Japan

**MM_O3****Optimization and Design 1**

Session Date	June 3 (Mon.), 2024
Session Time	10:20-11:40
Session Room	Room 3 (301)
Session Chair(s)	Prof. Yoshifumi Okamoto (Hosei University, Japan) Prof. Thomas Bauernfeind (Graz University of Technology, Austria)

MM_O3_01

10:20–10:40

■ Stochastic Determination of Synchronous Machines Parameters from Frequency Response FEM Simulations with Noisy Data

V. M. Jimenez-Mondragon, R. Escarela-Perez, L. E. Castillo Gonzalez, J. C. Olivares-Galvan, I. Lopez Garcia, and F. Gonzalez-Montañez

Metropolitan Autonomous University, Mexico

MM_O3_02

10:40–11:00

■ Shape Sensitivity Analysis for Optimal Design of Time-Harmonic Electroquasistatic System Based on Continuum Approach

Seung Eun Rho and Il Han Park

Sungkyunkwan University, Korea

MM_O3_03

11:00–11:20

■ Analytical Design and Optimization of Surface-Mounted PMSMs with Equal-Thickness Air Gap

Ning Wang, Wenliang Zhao, Gaoyang Xu, and Xiuhe Wang

Shandong University, China

MM_O3_04

11:20–11:40

■ Topology Optimization of Microwave Devices with Thin Structure

Takuto Jibiki¹, Takeshi Kawasaki², Masahiro Tanomura², and Hajime Igarashi¹

¹Hokkaido University, Japan, ²Sumitomo Electric Industries, Ltd., Japan

MM_O4

Devices and Applications 1

Session Date	June 3 (Mon.), 2024
Session Time	10:20-12:00
Session Room	Room 4 (302)
Session Chair(s)	Prof. Hajime Igarashi (Hokkaido University, Japan) Prof. Fei Zhao (Harbin Institute of Technology, China)

MM_O4_01

10:20-10:40

- Dual Inverter Parallel Consequent Pole PM-Assisted Two-Layer Sub-Harmonic Synchronous Machine

S M Sajjad Hossain Rafin¹, Qasim Ali², and Osama Mohammed¹

¹*Florida International University, USA*, ²*Sukkur IBA University, Pakistan*

MM_O4_02

10:40-11:00

- Analytical Computation of Torque-Speed Characteristics and Efficiency Map for PM Motors

Ajay Pal Singh¹, Sai Ram Boggavarapu², and Ikenna Cajetan Nlebedim¹

¹*Critical Materials Innovation Hub, Ames National Laboratory, USA*, ²*Indian Institute of Technology Dharwad, India*

MM_O4_03

11:00-11:20

- Torque Ripple Suppression in AC Motor Using Magnetic Periodic Reversal Spring

Haruaki Ito and Masayuki Kato

Ibaraki University, Japan

MM_O4_04

11:20-11:40

- A Design Method of Reducing No-Load Harmonic Voltage of Interior Permanent Magnet Shaft Generator for Ships

Jaemyung Cha¹, Gihoon Yoo¹, and Seungyong Hahn²

¹*HD Hyundai Electric Co., Ltd., Korea*, ²*Seoul National University, Korea*

MM_O4_05

11:40-12:00

- Structural and Analytical Modeling of a Long Stroke Variable Stiffness Magnetic Spring with Application to Wave Energy Converter

Jiyu Zhang, Lei Huang, Haitao Liu, and Jianlong Yang

Southeast University, China



MA_01
**Numerical
Techniques 2**

Session Date	June 3 (Mon.), 2024
Session Time	15:20-17:20
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Yasushi Kanai (Niigata Institute of Technology, Japan) Prof. Shuhong Wang (Xi'an Jiaotong University, China)

MA_O1_01

15:20–15:40

- Efficient Low-Frequency Human Exposure Assessment with the Maximum Entropy Snapshot Sampling

Steven Stroka, Fotios Kasolis, Norman Haußmann, and Markus Clemens

University of Wuppertal, Germany

MA_O1_02

15:40–16:00

- A T, Φ - Φ Multiscale Finite Element Formulation for Eddy Current Problems in Open Magnetic Circuits

Valentin Hanser, Markus Schöbinger, and Karl Hollaus

Institute of Analysis and Scientific Computing Vienna University of Technology, Austria

MA_O1_03

16:00–16:20

- Time-Domain Homogenization of Windings Using B-Input Cauer Ladder Network Method

Yasuhito Takahashi¹, Shingo Hiruma², Koji Fujiwara¹, and Satoshi Imamori³

¹Doshisha University, Japan, ²Kyoto University, Japan, ³Fuji Electric Co., Ltd., Japan

MA_O1_04

16:20–16:40

- Efficient DGTD Method with LTS and IWDL Formulation to Solve Multi-Scale Electromagnetic Scattering Problems

Marlon Jesus Lizarazo Urbina and Elson Jose Silva

Federal University of Minas Gerais, Brazil

MA_O1_05

16:40–17:00

- Effective Interface Condition for Electromagnetic Shielding Using the T- Φ -Formulation in 3D

Markus Schöbinger and Karl Hollaus

Institute of Analysis and Scientific Computing Vienna University of Technology, Austria

MA_O1_06

17:00–17:20

- Inductance Computation Acceleration with Fast Multipole Method for PEEC Simulation

Riki Sakakibara and So Noguchi

Hokkaido University, Japan

MA_O2

**Static and Quasi-
Static Fields 2**

Session Date	June 3 (Mon.), 2024
Session Time	15:20-17:00
Session Room	Room 2 (Samda B)
Session Chair(s)	Prof. Jan Sykulski (University of Southampton, UK) Prof. Haijun Zhang (Hubei University of Arts and Science, China)

MA_O2_01

15:20-15:40

■ **Fast Calculation of Shielding Effectiveness in Wireless Power Transfer Systems**

Leonardo Sandrolini, Mattia Simonazzi, and Ugo Reggiani

University of Bologna, Italy

MA_O2_02

15:40-16:00

■ **Multiscale Hysteresis Model of Electrical Steel Sheet in Finite Element Simulation of Transformer**

Floran Martin¹, Julien Taurines¹, Paavo Rasilo², Anouar Belahcen¹, and Laurent Daniel³

¹Aalto University, Finland, ²Tampere University, Finland, ³Laboratory of Electrical Engineering and Electronics of Paris (GeePs), France

MA_O2_03

16:00-16:20

■ **Attenuation Effect of Shielding Lines on Ionized Field of HVDC Conductors with the Presence of Atmospheric Fine Particles**

Zhilong Zou

Harbin Institute of Technology, China

MA_O2_04

16:20-16:40

■ **Homogenization Method Based on Cauer Ladder Network Representaion of Unit Cell**

Shingo Hiruma¹, Yasuhito Takahashi², and Tetsuji Matsuo¹

¹Kyoto University, Japan, ²Doshisha University, Japan

MA_O2_05

16:40-17:00

■ **Interior Penalty Galerkin Methods for Time Domain Eddy Current Problems**

Sebastian Strasser and Hans-Georg Herzog

Technical University of Munich, Germany

**MA_03****Optimization and Design 2**

Session Date	June 3 (Mon.), 2024
Session Time	15:20-17:00
Session Room	Room 3 (301)
Session Chair(s)	Prof. Marco Arjona (La Laguna Institute of Technology, Mexico) Prof. Meng Xia (Hangzhou City University, China)

MA_03_01

15:20-15:40

- Physics-Informed Conditional Generative Adversarial Network for Inverse Electromagnetic Problems

Amir Akbari and David Lowther

McGill University, Canada

MA_03_02

15:40-16:00

- Parameter and Topology Optimization Method for IPM Motors Using Multimodal Neural Network

Kazuhisa Iwata¹, Hidenori Sasaki¹, Hajime Igarashi², Daisuke Nakagawa³, and Tomoya Ueda³

¹*Hosei University, Japan*, ²*Hokkaido University, Japan*, ³*Nidec Research and Development Center, Nidec Corporation, Japan*

MA_03_03

16:00-16:20

- Optimization Design of Surface Permanent Magnet Synchronous Motor with Hybrid Magnets Using Analytical Method

Chengwu Diao¹, Wenliang Zhao¹, Longxuan Li¹, and Byung-II Kwon²

¹*Shandong University, China*, ²*Hanyang University, Korea*

MA_03_04

16:20-16:40

- A Topology Optimization of Electromagnetic Devices Based on Kernel Ridge Regression as a Variant of Gaussian Network-Based Shape Representation

Takahiro Sato¹, Kota Watanabe¹, and Hajime Igarashi²

¹*Muroran Institute of Technology, Japan*, ²*Hokkaido University, Japan*

MA_03_05

16:40-17:00

- Multi-Condition Design and Optimization of a Hairpin Permanent Magnet Motor Based on Space Dimension Reduction

Chunlei Han, Xiaoyong Zhu, and Zixuan Xiang

Jiangsu University, China

MA_04

Devices and Applications 2

Session Date	June 3 (Mon.), 2024
Session Time	15:20-17:20
Session Room	Room 4 (302)
Session Chair(s)	Prof. Sang-Yong Jung (Sungkyunkwan University, Korea) Prof. Jangho Seo (Kyungpook National University, Korea)

MA_04_01

15:20-15:40

■ A Neural-Network Model for Helping the Synthesis of a Dual-Frequency Induction Heating Device

Paolo Di Barba¹, Arash Ghafoorinejad¹, Maria Evelina Mognaschi¹, Fabrizio Dughiero², Michele Forzan², and Elisabetta Sieni³

¹*University of Pavia, Italy*, ²*University of Padova, Italy*, ³*University of Insubria, Italy*

MA_04_02

15:40-16:00

■ A Novel Topology of an Axial Flux Type Synchronous Motor

Se-Eun Kim and Yong-Min You

Chonnam National University, Korea

MA_04_03

16:00-16:20

■ Analysis of Split-Tooth Dual Winding Dual Magnet Machines with Low Mutual Inductance

Pengcheng Sun, Shaofeng Jia, and Deliang Liang

State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China

MA_04_04

16:20-16:40

■ High-Power and -Speed Induction Machines Iron Loss Calculation Incorporating the Electro-Thermal Impact

Omolbanin Taqavi, Ze Li, and Narayan C. Kar

University of Windsor, Canada

MA_04_05

16:40-17:00

■ Power Factor Improvement of Variable Leakage Flux PM Motor under Different Operation Conditions

Xue Zhou, Xiaoyong Zhu, and Zixuan Xiang

Jiangsu University, China

MA_04_06

17:00-17:20

■ Transient Performance Characterization for a Shielded Rogowski Coil Based Low Power Current Transformer

Youpeng Huangfu¹, Marco Faifer², Roberto Ottoboni², Sergio Toscani², and Shuhong Wang¹

¹*Xi'an Jiaotong University, China*, ²*Politecnico di Milano, Italy*



TM_O1

Numerical
Techniques 3

Session Date	June 4 (Tue.), 2024
Session Time	10:00-11:20
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Anouar Belahcen (Aalto University, Finland) Prof. Abdullah Eroglu (University of Massachusetts Boston, USA)

TM_O1_01

10:00–10:20

■ Time Signals Prediction from Electromagnetic Simulations of Lossy Devices Using LSTM

Rodrigo Silva Rezende, Albert Piwonski, and Rolf Schuhmann

Technical University of Berlin, Germany

TM_O1_02

10:20–10:40

■ Simulation of Thin Wires and Dielectric Bodies in Multilayered Medium Using FEBI

Shubin Zeng¹, Yiqian Mao¹, Yueqin Huang², and Jiefu Chen²¹*Cyentech, USA*, ²*University of Houston, USA*

TM_O1_03

10:40–11:00

■ Rigorous Treatment of Construction Imperfections in High-Frequency Microstrip EMC Filters

Ioannis Koutzoglou¹, Ioannis Stamatopoulos², Dimitrios I. Karatzidis¹, Christos S. Antonopoulos¹, and Nikolaos V. Kantartzis¹¹*Aristotle University of Thessaloniki, Greece*, ²*Directorate of Transport and Communications of Eastern Thessaloniki, Greece*

TM_O1_04

11:00–11:20

■ Parametrized Cauer Ladder Network Equations for Reduced Representation of Nonlinear Magnetic Field

Tetsuji Matsuo¹, Miwa Tobita¹, and Hamed Eskandari²¹*Kyoto University, Japan*, ²*Science Solutions International Laboratory, Inc., Japan*

TM_O2

**Static and Quasi-
Static Fields 3**

Session Date	June 4 (Tue.), 2024
Session Time	10:00-11:20
Session Room	Room 2 (Samda B)
Session Chair(s)	Prof. Tiebing Lu (North China Electric Power University, China) Prof. Lihua Zhu (Tianjin University of Technology, China)

TM_O2_01

10:00-10:20

- Calculation of Ion Flow Field of HVDC Lines Considering the Influence of Stochastic Suspended-Particles

Nanxuan Shen, Fuqin Hao, Tiebing Lu, and Xingming Bian

North China Electric Power University, China

TM_O2_01

10:20-10:40

- Structural Aspects of Electromagneto-Quasistatic Field Formulations of Darwin-Type Derived in the Port-Hamiltonian System Framework

Markus Clemens, Marvin-Lucas Henkel, Fotios Kasolis, and Michael Günther

University of Wuppertal, Germany

TM_O2_03

10:40-11:00

- A GPU Accelerated Semi-Implicit Method for Large-Scale Nonlinear Eddy-Current Problems Using Adaptive Time Step Control

Bernhard Kähne and Markus Clemens

University of Wuppertal, Germany

TM_O2_04

11:00-11:20

- Computation of Movement Involved Eddy Current Field Using Boundary Adaptation of Overlapping Mesh

Xiaotong Fu^{1,2}, Shuai Yan¹, Zhifu Chen¹, and Zuoqiang Ren^{1,3}

¹*Chinese Academy of Sciences, China*, ²*University of Chinese Academy of Sciences, China*, ³*Laboratory of Electrical Engineering and Electronics of Paris (GeePs), France*



TM_03

Material
Modeling 1

Session Date	June 4 (Tue.), 2024
Session Time	10:00-11:20
Session Room	Room 3 (301)
Session Chair(s)	Prof. Valerio De Santis (University of L'Aquila, Italy) Prof. Jong-Suk Ro (Chung-Ang University, Korea)

TM_03_01

10:00-10:20

■ Multiscale Thin Shell Finite Element Model for Mn-Zn Ferrites with Realistic Grain Structure

Reda Elkhadrawy¹, Joonas Vesa¹, Janne Ruuskanen¹, Timo Tarhasaari¹, Vasiliki Tsakaloudi², and Paavo Rasilo¹

¹Tampere University, Finland, ²Centre for Research & Technology Hellas, Greece

TM_03_02

10:20-10:40

■ Effect of Anisotropic Localization in a Ferroelectric Multiscale Model

Zhaochen Li^{1,2} and Romain Corolle^{1,2,3}

¹New York University Shanghai, China, ²New York University, USA, ³Paris-Saclay University, France

TM_03_03

10:40-11:00

■ AC Hysteresis Modeling of Grain-Oriented Silicon Steel Considering DC Hysteresis and Anomalous Field

Ayane Kira¹, Yanfui Gao¹, Weimin Guan², Hamzehbahmani Hamed³, and Kazuhiro Muramatsu⁴

¹Oita University, Japan, ²Wuhan University, China, ³Durham University, UK, ⁴Saga University, Japan

TM_03_04

11:00-11:20

■ Local Resistivity Model for Soft Magnetic Composite Materials

Joonas Vesa¹, Antero Marjamäki¹, Reda Elkhadrawy¹, Hajime Igarashi², and Paavo Rasilo¹

¹Tampere University, Finland, ²Hokkaido University, Japan

TM_04

Devices and Applications 3

Session Date	June 4 (Tue.), 2024
Session Time	10:00-11:20
Session Room	Room 4 (302)
Session Chair(s)	Prof. Rongge Yan (Hebei University of Technology, China) Prof. Seok-Won Jung (Sungkyunkwan University, Korea)

TM_04_01

10:00-10:20

■ Post-Processing-Based Flux-Weakening Control of Variable Flux Reluctance Machines

Doga Ceylan, Konstantin Boynov, and Elena Lomonova

Eindhoven University of Technology, The Netherlands

TM_04_02

10:20-10:40

■ Power Transmission Characteristics Analysis of Multi-Port Dual-Flux-Modulator Magnetic Geared Machine Based on Analytical Model

Meng Lu, Shuo Qin, and Xiao Liu

Hunan University, China

TM_04_03

10:40-11:00

■ Experimental Validation of RC Snubber Circuit for GaN-Based Battery Formation Device with Switching Noise Coupling Problem

Jong-Hun Lim¹, Je-yeong Lim¹, Dong Hwan Kim¹, Kiseok Jeong², Taemin Jang², and Byoung Kuk Lee¹

¹*Sungkyunkwan University, Korea*, ²*WONIK PNE Co., Ltd., Korea*

TM_04_04

11:00-11:20

■ Comparative Analysis of Electromagnetic Characteristics of Permanent Magnet Linear Oscillating Actuators with Different Laminated Methods

Hongbin Zhang¹, Zhike Xu², Zhan Shen², Shuhua Fang², and Haitao Yu²

¹*Jiangsu Maritime Institute, China*, ²*Southeast University, China*



TA_01
**Numerical
Techniques 4**

Session Date	June 4 (Tue.), 2024
Session Time	15:50-17:10
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Ruth Sabariego (KU Leuven, Belgium) Prof. Tetsuji Matsuo (Kyoto University, Japan)

TA_O1_01

15:50–16:10

■ Modeling of a Winding by Segmentation and a Two Domain MethodKarl Hollaus¹, Markus Schöbinger¹, and Christian Türk²¹*Institute of Analysis and Scientific Computing Vienna University of Technology, Austria*, ²*Federal Ministry of Defense, Austria***TA_O1_02**

16:10–16:30

■ Application of POD to Time Domain Simulation of Nonlinear Field–Circuit Coupled ProblemsYaxing Zhou¹, Shuai Yan¹, Tianyu Zheng¹, Xi Ran^{1,2}, Xiaoyu Xu¹, and Zhuoxiang Ren^{1,3}¹*Chinese Academy of Sciences, China*, ²*University of Chinese Academy of Sciences, China*, ³*Sorbonne University, France***TA_O1_03**

16:30–16:50

■ Error Estimation of the Cauer Ladder Network Method for the Time–Domain AnalysisMiwa Tobita¹, Stéphane Clénet², Shingo Hiruma¹, Wei Chen², and Tetsuji Matsuo¹¹*Kyoto University, Japan*, ²*Arts et Metiers Institute of Technology, University of Lille, France***TA_O1_04**

16:50–17:10

■ A Prediction Model of Torque Control Parameters Considering Temperature–Dependency of IPMSM for High Speed Railway ApplicationsVu Khanh Tran¹, Jae–Gil Lee², Pil–Wan Han², and Yon–Do Chun²¹*University of Science and Technology, Korea*, ²*Korea Electrotechnology Research Institute, Korea*

TA_02

**Static and Quasi-
Static Fields 4**

Session Date	June 4 (Tue.), 2024
Session Time	15:50-17:10
Session Room	Room 2 (Samda B)
Session Chair(s)	Prof. Xiaojun Zhao (North China Electric Power University, China) Dr. Floran Martin (Aalto University, Finland)

TA_O2_01

15:50-16:10

■ Identification of an Arbitrary-Surface Harmonic Magnetic Model from Close Measurements

Gauthier Derenty-Camenen^{1,2}, Olivier Chadebec¹, Olivier Pinaud¹, Laure-Line Rouve¹, and Steeve Zozor²

¹*University Grenoble Alpes, CNRS Grenoble INP, G2Elab, France*, ²*University Grenoble Alpes, CNRS Grenoble INP, GIPSA-Lab, France*

TA_O2_02

16:10-16:30

■ Numerical Analysis of Partial Discharge on Multi-Dielectric Insulator Forming Migration-Ohmic Model

Hyemin Kang, Yonghee Kim, and Se-Hee Lee

Kyungpook National University, Korea

TA_O2_03

16:30-16:50

■ A Posteriori Error Estimators for Quantity of Interest in Eddy Current-Based Non-Destructive Testings

Zuqi Tang¹, Emmanuel Creusé², and Serge Nicaise²

¹*University of Lille, France*, ²*Polytechnic University of Hauts-de-France, France*

TA_O2_04

16:50-17:10

■ A Modified Fixed-Point Iteration Algorithm for Magnetic Field Computation with Hysteresis Models

Shuaichao Yue¹, Jiatong Yin¹, Yongjian Li¹, Yu Dou¹, Ruiying Chen¹, and Jun Liu²

¹*State Key Laboratory of Reliability and Intelligence of Electrical Equipment, Hebei University of Technology, China*,

²*Cardiff University, UK*



TA_03

Material Modeling 2

Session Date	June 4 (Tue.), 2024
Session Time	15:50-17:10
Session Room	Room 3 (301)
Session Chair(s)	Prof. Yanli Zhang (Shenyang University of Technology, China) Dr. Mattia Simonazzi (University of Bologna, Italy)

TA_03_01

15:50-16:10

■ Shielding Effectiveness Evaluation of Wall-Integrated Energy Storage Devices

Leonardo Sandrolini and Mattia Simonazzi

University of Bologna, Italy

TA_03_02

16:10-16:30

■ Anisotropic Vector Hysteresis Modeling under Multiaxial Stress

Ruiying Chen¹, Floran Martin², Yongjian Li¹, Shuaichao Yue¹, Yating Li¹, and Anouar Belahcen²

¹*Hebei University of Technology, China*, ²*Aalto University, Finland*

TA_03_03

16:30-16:50

■ An Anisotropic Hysteresis Model Considering Microstructural Feature

Yating Li¹, Yongjian Li¹, Shuaichao Yue¹, Ruiying Chen¹, Zhiwei Lin¹, and Jun Liu²

¹*State Key Laboratory of Reliability and Intelligence of Electrical Equipment, Hebei University of Technology, China*,

²*Cardiff University, UK*

TA_03_04

16:50-17:10

■ Macroscopic Modeling of Mn-Zn Ferrites Based on Analytical Dynamic Material Models

Reda Elkhadrawy¹, Joonas Vesa¹, Vasiliki Tsakaloudi², and Paavo Rasilo¹

¹*Tampere University, Finland*, ²*Centre for Research & Technology Hellas, Greece*

TA_04

Devices and Applications 4

Session Date	June 4 (Tue.), 2024
Session Time	15:50-17:30
Session Room	Room 4 (302)
Session Chair(s)	Prof. Maria Evelina Mognaschi (University of Pavia, Italy) Prof. Youpeng Huangfu (Xi'an Jiaotong University, China)

TA_04_01

15:50-16:10

- Research on Dynamic Model of Linear Induction Machine Considering Edge Effect and Core Saturation from Winding Function Theory

Dingying Wu¹, Jin Xu^{1,2}, Heyun Lin¹, and Mingke Li²

¹Southeast University, China, ²Naval University of Engineering, China

TA_04_02

16:10-16:30

- A Study on Field Current Ripple and Iron Loss for Wound Field Synchronous Motor Using Response Surface Methodology

Jae-Hoon Cho, Nam-Ho Kim, Ho-Jin Oh, Young-Ho Hwang, Seok-Won Jung, and Sang-Yong Jung
Sungkyunkwan University, Korea

TA_04_03

16:30-16:50

- Analysis of Electromagnetic Force and Vibration in Interior Permanent Magnet Synchronous Motors with Dynamic Eccentricity

Jun Nie¹, Daohan Wang^{1,2}, Rongxiao Yan¹, Bingdong Wang¹, Xincheng Tu¹, and Xiuhe Wang¹

¹Shandong University, China, ²Shenzhen Research Institute of Shandong University, China

TA_04_04

16:50-17:10

- Design and Analysis of a Hybrid Excited Linear Machine with Characteristic of Air Gap Balanced

Rong Guo¹, Baocheng Guo², Fengyu Zhang³, and Yuxin Shen¹

¹Beijing University of Civil Engineering and Architecture, China, ²Nanjing Normal University, China,

³University of Nottingham, UK

TA_04_05

17:10-17:30

- Multi-Physics Modeling for Thermal Interruption Capability Estimation of CO₂/O₂ Mixed Gas Circuit Breaker

Hyun-Mo Ahn¹, Hyun-Jae Jang¹, Jun-Kyu Park¹, Ki-Dong Song¹, Sung-Chin Hahn², and Yeon-Ho Oh¹

¹Korea Electrotechnology Research Institute, Korea, ²Korea Electrical Manufacturers Association, Korea

**WM_O1****Numerical Techniques 5**

Session Date	June 5 (Wed.), 2024
Session Time	10:00-11:20
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Sami Barmada (University of Pisa, Italy) Prof. Fan Yang (Chongqing University, China)

WM_O1_01

10:00-10:20

■ Analysis of Electromagnetic Field Interactions on Silver Nanospheres and Silver NanowiresAslıhan Aktepe¹, Zeliha Cansu Canbek Özdiç², Tugba Haykir Ergin², and Hüseyin Arda Ülkü²¹Gebze Technical University, Turkey, ²Yeditepe University, Turkey**WM_O1_02**

10:20-10:40

■ High-Speed Numerical Simulation of Shielding Current Analysis in Crack-Free HTS Thin Film: Improvement of ICCGH Method

Ayumu Saitoh

Yamagata University, Japan

WM_O1_03

10:40-11:00

■ Homogenization Technique of Nanocrystalline Cores Considering the Inter-Laminar Eddy CurrentsShengze Gao¹, Yanhui Gao², Xiaojun Zhao¹, Kazuhiro Muramatsu³, Weimin Guan⁴, and Takashi Todaka²¹North China Electric Power University, China, ²Oita University, Japan, ³Saga University, Japan⁴Wuhan University, China**WM_O1_04**

11:00-11:20

■ Toward the Modeling of Thin Conductive Layer with Hybrid FDTD-PITD Method

Liang Ma, Xikui Ma, Mingjun Chi, Ru Xiang, and Xiaojie Zhu

State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China

WM_O2

Coupled Problems

Session Date	June 5 (Wed.), 2024
Session Time	10:00-11:20
Session Room	Room 2 (Samda B)
Session Chair(s)	Prof. Jin-hwan Lee (Chonnam National University, Korea) Prof. Ivan Ganachev (Shibaura Mechatronics Corporation and Chubu University, Japan)

WM_O2_01

10:00-10:20

■ Adaptive Mesh Refinement and Embedded Boundary Method for Streamer Discharge Simulations

Bo Lin¹, Chijie Zhuang², and Qingyuan Shi²

¹National University of Singapore, Singapore, ²Tsinghua University, China

WM_O2_02

10:20-10:40

■ Adaptive Local Mesh Refinement for Steady State and Transient Simulation of Semiconductor Devices

Qingyuan Shi¹, Chijie Zhuang^{1,2}, Bo Lin³, Dan Wu², Li Li², and Rong Zeng¹

¹Tsinghua University, China, ²Beijing Huairou Laboratory, China, ³National University of Singapore, Singapore

WM_O2_03

10:40-11:00

■ A Comprehensive Coupled Methodology for Calculation and Suppression of DC Bias in UHVDC Transmission Systems

Jun Luo¹, Shiyou Yang², and Xiaoyong Zhu¹

¹Jiangsu University, China, ²Zhejiang University, China

WM_O2_04

11:00-11:20

■ Study on Transformer Electric Field in Different Degrees of Insulation Aging Considering Temperature Effects

Dezhi Chen¹, Sijun Wang¹, Jiangxiong Song², Haonan Bai¹, Xianghui Chang¹, and Ziyuan Xin¹

¹Shenyang University of Technology, China, ²State Grid Xingtai Power Supply Co., Ltd., China



WM_O3

Optimization and Design 3

Session Date	June 5 (Wed.), 2024
Session Time	10:00-11:20
Session Room	Room 3 (301)
Session Chair(s)	Prof. Jang-Young Choi (Chungnam National University, Korea) Prof. Yasuhito Takahashi (Doshisha University, Japan)

WM_O3_01

10:00-10:20

I A Multi-Topology Efficient Optimization Model for Hairpin Permanent Magnet Synchronous Motor Based on Automated Machine Learning

Jun Luo, Xiaoyong Zhu, and Jiqi Wu

Jiangsu University, China

WM_O3_02

10:20-10:40

I Fast Analysis and Design for 3D-Structured Magnetic Components Using Surrogate Model from Transfer LearningYuki Sato¹, Hirokazu Matsumoto¹, Akito Maruo², Takahiro Sato³, and Hidenori Sasaki⁴¹*Aoyama Gakuin University, Japan*, ²*Fujitsu Ltd., Japan*, ³*Muroran Institute of Technology, Japan*, ⁴*Hosei University, Japan*

WM_O3_03

10:40-11:00

I Grounding Current Mechanism of Converter Transformer Core and ClampHaonan Bai¹, Dezhi Chen¹, Guoxin Zhao¹, Xiu Zhou², Ziyuan Xin¹, and Xiaofeng Zheng¹¹*Key Laboratory of Special Machine and High Voltage Apparatus, Shenyang University of Technology, China*,²*State Grid Ningxia Electric Power Co., Ltd., China*

WM_O3_04

11:00-11:20

I Structural Parameters Optimization of Double Pendulum Damper Used in AC Transmission Lines Aiming at Reducing Corona Discharge NoiseDonghui Wang^{1,2}, Songyang Zhang¹, Shengchang Ji², Honglu Guan¹, Zhuangzhuang Zhang¹, Shanshan Quan³, and Wenyi Wang⁴¹*State Grid Henan Electric Power Research Institute, China*, ²*Xi'an Jiaotong University, China*, ³*China Electric Power Research Institute, China*, ⁴*Central Southern China Electrical Power Design Institute, China*

WM_04

Devices and Applications 5

Session Date	June 5 (Wed.), 2024
Session Time	10:00-11:20
Session Room	Room 4 (302)
Session Chair(s)	Prof. Dongkuk Lim (University of Ulsan, Korea) Prof. Lei Huang (Southeast University, China)

WM_04_01

10:00-10:20

■ Alternative PM Motor Configurations Comparison for UAV Applications

Maria Sofia C. Pechlivanidou and Antonios G. Kladas

National Technical University of Athens, Greece

WM_04_02

10:20-10:40

■ A Magnetic Flux–Modulated Permanent Magnet Machine for Shaftless Pump–Jet Propulsor

Qinghai Qin, Haitao Yu, Shuhua Fang, Qiongfang Zhang, and Yulei Liu

Southeast University, China

WM_04_03

10:40-11:00

■ Characteristic Analysis of Two-Phase Stator-Permanent-Magnet Hybrid Stepping Machines with Radial and Tangential Magnetization

Xiaobao Chai, Jinglin Liu, Qian Zhang, and Lanlan Zheng

Northwest Polytechnical University, China

WM_04_01

11:00-11:20

■ Analytical Study and Experimental Verification of Electromagnetic Vibration Sources and Optimization of Rotor Skew in Surface Mounted Permanent Magnet Synchronous Machine

Jun-Won Yang¹, Manh-Dung Nguyen¹, Tae-Seong Kim¹, Yong-Joo Kim¹, Kyung-Hun Shin², and Jang-Young Choi¹

¹*Chungnam National University, Korea*, ²*Changwon National University, Korea*



WA_01
**Numerical
Techniques 6**

Session Date	June 5 (Wed.), 2024
Session Time	15:50-16:50
Session Room	Room 1 (Samda A)
Session Chair(s)	Prof. Seok-Won Jung (Sungkyunkwan University, Korea) Prof. Lin Li (North China Electric Power University, China)

WA_O1_01

15:50–16:10

- An Auxiliary Differential Equation–Finite Element Method for 3D Transient Simulation of Currents in HVDC Insulation

Luca Edoardo Mosconi, Carlo de Falco, and Luca Di Rienzo

Politecnico di Milano, Italy

WA_O1_02

16:10–16:30

- Multi-Scale Finite Element Method Applied in 3D Nonlinear Problem

Xinyu Ma¹, Nana Duan¹, Weijie Xu², and Shuhong Wang¹

¹*Xi'an Jiaotong University, China*, ²*State Grid Shanxi Electric Power Research Institute, China*

WA_O1_03

16:30–16:50

- Homogenized–Winding Model of Inductor Considering Stray Capacitance at High Frequency for Finite Element Electromagnetic Filed Analysis

Xuanda Hou¹, Kazuya Kawai¹, Hiroshi Dozono¹, Kazuhiro Muramatsu¹, Norihiro Ogishima², Nguyen Gia Minh Thao², Keisuke Fujisaki², Yanhui Gao³, Weimin Guan⁴, Cuihua Tian⁴, Jiaxin Yuan⁴, and Baichao Chen⁴

¹*Saga University, Japan*, ²*Toyota Technological Institute, Japan*, ³*Oita University, Japan*, ⁴*Wuhan University, China*

WA_O2

Wave Propagation

Session Date	June 5 (Wed.), 2024
Session Time	15:50-17:10
Session Room	Room 2 (Samda B)
Session Chair(s)	President Chang-Seop Koh (Chungbuk National University, Korea) Prof. Jang-Young Choi (Chungnam National University, Korea)

WA_O2_01

15:50–16:10

- Measurement Uncertainty of Schumann Resonances with the EFIELD Experiment on Board Dragonfly

Paul Lagouanelle and Alice Le Gall

LATMOS/IPSL, UVSQ Paris-Saclay University, Sorbonne University, France

WA_O2_02

16:10–16:30

- Electron Density Inversion of Plasma Wake of Hypersonic Target

Zhou Zhou, Jing Tian, and Pu Tang

University of Electronic Science and Technology of China, China

WA_O2_03

16:30–16:50

- A Stable Discontinuous Galerkin Time-Domain Method with Implicit–Explicit Time-Marching for Lossy Media

Ru Xiang, Xikui Ma, Liang Ma, Mingjun Chi, and Jiawei Wang

Xi'an Jiaotong University, China

WA_O2_04

16:50–17:10

- An Improved Method for Electromagnetic Calculations of Dynamically Varying Cantilever Beam RF-MEMS Switches

Wei Wang, Jiawei Wang, Minyu Mao, and Jinghui Shao

State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China

**WA_O3****Optimization and Design 4**

Session Date	June 5 (Wed.), 2024
Session Time	15:50-17:10
Session Room	Room 3 (301)
Session Chair(s)	Prof. Han-Kyeol Yeo (The University of Suwon, Korea) Prof. Dong-Kuk Lim (University of Ulsan, Korea)

WA_O3_01

15:50–16:10

- A Manufacturing Oriented Topology Optimization Methodology for Permanent Magnet Synchronous Motor

Meng Xia¹, Jing Li¹, and Shiyou Yang²¹*Hangzhou City University, China*, ²*Zhejiang University, China***WA_O3_02**

16:10–16:30

- Design and Optimization of a High-Efficiency Light-Weight Permanent Magnet In-Wheel Motor with Torque Enhancement

Zixuan Xiang, Suiyuan Gui, and Jiaqiang Wei

*Jiangsu University, China***WA_O3_03**

16:30–16:50

- Design of Anode Saturable Reactor Core Based on Electromagnetic-Thermal Simulation and Neural Network Modeling

Jiaxin Yuan¹, Xuzhe Li¹, Hang Zhou¹, Yifan Wang¹, Zuoquan Mo², Yanli Zhang³, Yanhui Gao⁴, and Kazuhiro Muramatsu⁵¹*Wuhan University, China*, ²*China Railway Guangzhou Group Co., Ltd., China*, ³*Shenyang University of Technology, China*, ⁴*Oita University, Japan*, ⁵*Saga University, China***WA_O3_04**

16:50–17:10

- Motor Characteristics Map Prediction Using Deep Operator Neural Networks

Hidenori Sasaki¹, Kazuhisa Iwata¹, Takahiro Sato², and Yuki Sato³¹*Hosei University, Japan*, ²*Muroran Institute of Technology, Japan*, ³*Aoyama Gakuin University, Japan*

WA_O4

Devices and Applications 6

Session Date	June 5 (Wed.), 2024
Session Time	15:50-16:30
Session Room	Room 4 (302)
Session Chair(s)	Prof. Daohan Wang (Shandong University, China) Prof. Jiaxin Yuan (Wuhan University, China)

WA_O4_01

15:50–16:10

- Analysis and Reduction of Detent Force in Flat Permanent Magnet Linear Motor with Inner-Arc Auxiliary Teeth

Qiongfang Zhang, Haitao Yu, Yulei Liu, and Qinghai Qin

Southeast University, China

WA_O4_02

16:10–16:30

- Novel Distributed Magnet Flux Modulation Machines with High Power Factor and Torque Density

Pengcheng Sun, Shaofeng Jia, and Deliang Liang

State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China