IEEE TRANSACTIONS ON

MAGNETICS

A PUBLICATION OF THE IEEE MAGNETICS SOCIETY

JUNE 2021 VOLUME 57 NUMBER 6 IEMGAQ (ISSN 0018-9464)

PART I of TWO PARTS

SPECIAL ISSUE ON ELECTROMAGNETIC FIELD COMPUTATION

SPECIAL ISSUE PAPERS

Magnetism in Solids

1600104 **A Consistent Scheme for the Precise FDTD Modeling of the Graphene Interband Contribution**
S. Amanatiadis, T. Zygiridis, T. Ohtani, Y. Kanai, and N. Kantartzis

Magnetic Materials

2000504 **3-D Analysis of Soft Magnetic Composite Using Discrete Element Method in Frequency Domain**
H. Sato and H. Igarashi

2400205 **Coupled Electromagnetic and Hydrodynamic Modeling for Semiconductors Using DGTD**
A. C. Gungor, T. Ehrengruber, J. Smajic, and J. Leuthold

2500805 **Generating Bessel Beams Efficiently in Microwave With High Transmission Metasurfaces**
J. Li, Y. Yuan, Y. Wang, S. Yang, Q. Wu, and K. Zhang

2500904 **Exposed Surface and Confinement Effects on the Electronic, Magnetic, and Mechanical Properties of $LaTiO_3$ Slabs**
J. E. Antonio, J. M. Cervantes, J. L. Rosas-Huerta, M. Romero, R. Escamilla, and E. Carvajal

2501004 **Chaotic Neural Network-Based Hysteresis Modeling With Dynamic Operator for Magnetic Shape Memory Alloy Actuator**
C. Zhang, Y. Yu, Y. Wang, Z. Han, and M. Zhou

2900304 **Coupled-Mode Theory for Graphene-Based Metasurfaces**
M.-T. Passia and T. V. Yioultsis

Applied Magnetism and Phenomena

4001204 **Analysis of a Magnetostrictive Harvester With a Fully Coupled Nonlinear FEM Modeling**
C. S. Clemente, D. Davino, and V. P. Loschiavo

Biomagnetics

5000104 **Research on a Cell Proliferation Model Based on A549 Cell Line With Magnetic Field Stimulation**
N. Zhang, P. Song, Z. Wang, S. Ning, S. Wang, T. Zhu, and H. Qiu

5000204 **Impact of Parameters Variability on the Level of Human Exposure Due to Inductive Power Transfer**
P. Lagouanelle, O. Bottauscio, L. Pichon, and M. Zucca

5100504 **Efficient Solver for a Simplified Model of the Multi-Physics Heat Transfer Problem in Radio Frequency Ablation of Hepatic Tumors**
A. Akbari and D. D. Giannacopoulos

5100604 **Electromechanical Analysis of Red Blood Cell Under AC Electric Field**
B. Techaumnat and N. Panklang

5800404 **Effects of Transcranial Direct Current Stimulation on Stroke Based on Brain Functional Networks**
H. Yu, H. Wang, M. Liu, C. Wang, C. Sun, G. Xu, and L. Guo

5900104 **Real-Time Numerical Dosimetry of Low-Frequency Electromagnetic Fields by Using Multipoles**
F. Tavernier, R. Scorretti, N. Burais, H. Razik, and J.-Y. Gaspard

Magnetic Measurements and Instrumentation

6000304 **Magnetic Properties Identification by Using a Bi-Objective Optimal Multi-Fidelity Neural Network**
M. Baldan, P. Di Barba, and B. Nacke

6300704 **Comparison Study of First-Order Approximations of Nonlinear Eddy-Current Field Using Cauer Ladder Network Method**
H. Eskandari and T. Matsuo

6300804 **Anomalous Loss and Hysteresis Loop in Electrical Steel Sheet**
Z. He, L. Zhu, Z. Wang, and C.-S. Koh

6300904 **Proper Generalized Decomposition With Cauer Ladder Network Applied to Eddy Current Problems**
N. Köster, O. König, and O. Bíró

6301004 **Eddy-Current Field Analysis in Laminated Iron Cores Using Multi-Scale Model Order Reduction**
H. Eskandari, J. Gyselinck, and T. Matsuo

6301104 **Losses Computation in Thin Conductive Sheaths of Power Cables via an Integral Approach**
L. Giussani, L. Di Rienzo, M. Bechis, and C. de Falco

6301204 **Mirror Symmetry in Integral Formulations for Eddy Currents**
M. Passarotto, D. Klis, O. Rain, and R. Specogna

6301304 **High-Order Frequency Derivatives in Variational Eddy Current System**
S.-E. Rho, S.-G. Hong, and I. H. Park

6301404 **Semi-Analytical Computation of a Quasi-Static Field Induced by a 3-D Eddy Current Probe in Anisotropic Material With Rough Interfaces**
H. Chebbi and D. Prémel

6301505 **Multiport Model Order Reduction With Multiple Expansion Points**
K. Kuriyama, T. Mifune, and T. Matsuo

6301604 **Eddy Current Loss in Grain-Oriented Steel Laminations Due to Normal Leakage Flux**
W. Wang, A. Nysveen, and N. Magnusson

6301704 **Finite Element Implementation of the Iterative Scalar Potential Method for the Computation of Eddy Currents**
O. Bíró and M. Gyimesi

6301804 **An Equilibrated Error Estimator for the Multiscale Finite Element Method of a 2-D Eddy Current Problem**
M. Schöbinger, J. Schöberl, and K. Hollaus

6301904 **Improved Post 1-D Analysis Using Distribution of Differential Magnetic Permeability**
R. Homma and Y. Ohsugi

6302004 **LOD Homogenization of Multiscale Eddy Current Problem in Time Domain**
X. Ren, A. Hannukainen, A. Belahcen, and Y. Perriard

Computation and Numerical Methods

7200205 **Interaction of Tearing Modes With Passive Structures in a Tokamak**
P. Bettini, G. Spizzo, D. Voltolina, L. Marrelli, M. Maraschek, V. Igochine, R. Specogna, the ASDEX Upgrade Team, and the EUROfusion MST1 Team

7200304 **Electrode Shape Optimization Using Continuum Sensitivity Analysis in Unipolar Space-Charge System**
C. Y. Choi and I. H. Park

7200404 **A New Loop-Based Hybrid Analytical Modeling Formulation and the Selection of Its Nonlinear Solver**
D. Ceylan, L. A. J. Friedrich, K. O. Boynov, and E. A. Lomonova

7200504 **A Deep Learning Surrogate Model for Topology Optimization**
S. Barmada, N. Fontana, A. Formisano, D. Thomopulos, and M. Tucci

7200604 **Thin-Wire Integral Equation Formulation With Quasistatic Darwin Approximation**
A. Bingler, S. Bilicz, M. Csörnyei, and Z. Badics

7200704 **Fast Time-Domain Solution of Dynamic Electromagnetic Problems Based on Sinc Interpolation**
Z. Guo, S. Wang, Z. Tang, and Z. Ren

7200804 **Accuracy of Difference Schemes in Electromagnetic Applications: A Trefftz Analysis**
I. Tsukerman

7200904 **Numerical Simulation of the Disintegration of an Aqueous Drop Under Electric Field**
W. Nantanawut, B. Techaumnat, and N. Tanthanuch

7300304 **Anisotropic Congruency-Based Vector Hysteresis Model Applied to Non-Oriented Laminated Steels**
R. Zeinali, D. Krop, and E. Lomonova

7401104 **Optimization of Frequency Selective Surfaces for the Design of Electromagnetic Mantle Cloaks**
G. Aiello, S. Alfonzetti, S. A. Rizzo, and N. Salerno

7401204 **Sensitivity Analysis of the Transfer Impedance of Shielded Cables With Braided Shields Using a Parameterized FEM Model**
S. Bauer, A. Reinbacher-Köstinger, O. Bíró, and C. Türk

7401304 **Finite Element Analysis of the Magneto-Mechanical Coupling Due to Punching Process in Electrical Steel Sheet**
N. M'zali, T. Henneron, A. Benabou, F. Martin, and A. Belahcen

7401404 **Nodal Meshless Method With Vectorial Shape Functions Based on H(Curl)**
L. A. G. Ortiz, R. C. Mesquita, and N. Z. Lima

7401504 **A New FEM–BEM Coupling for the 2-D Laplace Problem**
J. Lobry

7401604 **Comparison of Parallel-in-Space-and-Time Finite-Element Methods for Magnetic Field Analysis of Electric Machines**
Y. Takahashi, K. Fujiwara, T. Iwashita, and H. Nakashima

7401704 **Enhanced Technique for Metascreens Using the Generalized Finite Element Method**
M. Leumüller, B. Auinger, J. Schöberl, and K. Hollaus

7401805 **Time-Domain Finite-Element Method for Near-Field Applications With Magnetic Metamaterials**
Z. Gong and S. Yang

7401904 **New Magic Formula Demonstration Shows Unexpected Features of Geometrically Defined Matrices for Polyhedral Grids**
S. Pitassi, R. Ghiloni, and R. Specogna

7402004 **Hybrid Method of FEM and Divergence Theorem to Analyze Ion Flow Field Including Dielectric Film's Accumulation Charges**
T. Lu, B. Chen, Z. Zou, and D. Wang

7402104 **Guaranteed Quantity of Interest Error Estimate Based on Equilibrated Flux Reconstruction**
Z. Tang, S. Lou, A. Benabou, E. Creusé, S. Nicaise, J. Korecki, and J.-C. Mipo

7510104 **Electrostatic Field Feature Selection Technique for Breakdown Voltage Prediction of Sphere Gaps Using Support Vector Regression**
Z. Qiu, L. Zhang, Y. Liu, J. Liu, H. Hou, and X. Zhu

Electromagnetism and Electromagnetic Devices

8001304 **Torque and Loss Characteristics of Magnetic Gear by Bonded PM Magnetization Direction**
E.-J. Park, S.-Y. Jung, and Y.-J. Kim

8001404 **Structure and Suspension Force Analysis of Six-Pole Five Degrees of Freedom AC Hybrid Magnetic Bearing**
T. Zhang, Q. Le, and W. Zhu

8001504 **Surface Charging Models for Prediction of Dielectric Withstand in Medium Voltage Range**
A. Blaszczyk, E. Morelli, and P. Homayonifar

8104605 **A Novel Five-Phase Fractional Slot Concentrated Winding with Low Space Harmonic Contents**
B. Zhao, J. Gong, T. Tong, Y. Xu, E. Semail, N.-K. Nguyen, and F. Gillon

8104705 **Design of a Novel Claw Pole Transverse Flux Permanent Magnet Motor Based on Hybrid Stator Core**
W. Zhang, Y. Xu, and M. Sun

8104804 **Analysis of a Novel Surface-Mounted Permanent Magnet Motor With Hybrid Magnets for Low Cost and Low Torque Pulsation**
W. Zhao, Z. Yang, Y. Liu, and X. Wang

8104905 **A Novel DC-Biased Phase Current-Independent Drive High-Speed Vernier Reluctance Machine**
S. Jia, Y. Liang, D. Liang, and J. Liu

8105005 **Fault-Tolerance Performance Analysis of a Five-Phase Permanent-Magnet Linear Synchronous Machine**
Q. Jiang, Q. Lu, Y. Li, and Y. Shen

8105105 **Design and Comparison of Vernier Permanent-Magnet Machines With Different Winding Types Based on Fractional-Slot Windings**
Y. Ma and W. N. Fu

8105204 **Model Order Reduction Applied to a Linear Finite Element Model of a Squirrel Cage Induction Machine Based on POD Approach**
L. Montier, T. Henneron, S. Clénet, and B. Goursaud

8105304 **Parallel Computing of 3-D FEA Including Matrix Preconditioning for Analysis of Rotating Machines Coupled With Circuit Equations**
R. Utsunomiya and K. Yamazaki

8105404 **Modeling Skew by Single- and Multi-Slice 2-D Machine Models**
H. De Gersem and L. A. M. D'Angelo

8105504 **Modeling Movement in Electrical Machines**
D. Rodger

8105605 **Compensation Strategy Based on Rotating Rhombus Method for Five-Phase PMSM With One-Phase Terminal Short-Circuit Fault**
J. Huang, Y. Hao, Y. Sui, Z. Yin, L. Cheng, and P. Zheng

8105704 **Comparison of Methods Using Different Sources for Computing PWM Effects on Permanent Magnet Machines Considering Eddy Current Reaction**
S. Zhu, W. Hua, and B. Shi

8105804 **Efficient Estimation of Electrical Machine Behavior by Model Order Reduction**
F. Müller, A. Siokos, J. Kolb, M. Nell, and K. Hameyer

8105904 **Design and Analysis of a New Dual-Stator Consequent-Pole Flux Reversal Machine With Triple-PM Excitation**
Y. Meng, S. Fang, H. Wang, Z. Pan, and L. Qin

8106004 **Sensor Placement for Field Reconstruction in Rotating Electrical Machines**
S. Clénet, T. Henneron, and J. Korecki

8106104 **Robust Design and Analysis of Asymmetric-Excited Flux Reversal PM Linear Machine for Long-Stroke Direct Drive Propulsion**
Y. Shen, T. Shi, Q. Lu, and C. Xia

8106404 **Multi-Objective Optimization of a Line-Start Synchronous Machine Using a Self-Organizing Algorithm**
L. Knebl, J. Barta, G. Bramerdorfer, O. Vitek, and C. Ondrusek

8106505 **Comparative Study of Novel Doubly Fed Doubly Salient PM Machines With Different Stator/Rotor-Pole Number Combinations**
G. Ming, L. Wu, L. Zhang, and J. Zhu

8203004 **Topology Optimization Using Gabor Filter: Application to Synchronous Reluctance Motor**
Y. Otomo and H. Igarashi

8203105 **Performance of Permanent Magnet Synchronous Generator for Urban Water Pipeline Energy Harvester Considering Slotting and Load Effect on Radial Force Characteristic**
K. Kim, S. Paul, D. Bang, and J. Chang

8203205 **Optimization Design of a Novel Flux-Switching Transverse-Flux Permanent Magnet Tube Linear Motor**
D. Fu, Z. Jia, Y. Xu, J. Gong, F. Gillon, N. Bracikowski, and X. Wu

8203304 **Reliability-Based Design Optimization of a Permanent Magnet Motor Under Manufacturing Tolerance and Temperature Fluctuation**
J. Mun, J. Lim, Y. Kwak, B. Kang, K. K. Choi, and D.-H. Kim

8203405 **Multilevel Optimization of a Novel Dual-PM Dual-Electric Port Generator for Hybrid AC/DC System**
Q. Lin, S. Niu, J. Huang, W. Fu, and F. Cai

8203504 **Explainable Deep Neural Network for Design of Electric Motors**
H. Sasaki, Y. Hidaka, and H. Igarashi

8203604 **Suspension Performance Analysis on the Novel Hybrid Stator Type Bearingless Switched Reluctance Motor**
T. Zhang, J. Chen, and W. Zhu

8203704 **Induction Motor Analysis by Considering Hysteresis Loops in Stator and Rotor**
K. Yamazaki and S. Kokubu

8203805 **Surrogate Models for Design and Optimization of Inverter-Fed Synchronous Motor Drives**
I. Ibrahim, R. Silva, M. H. Mohammadi, V. Ghorbanian, and D. A. Lowther

8203905 **Analysis and Design of a New Relieving-DC-Saturation Transverse-Flux Tubular Motor With Complementary Magnetic Circuit**
Z. Li, X. Zhao, S. Niu, and W. N. Fu

8204004 **Nonlinear Analytical Analysis of External Rotor Permanent Magnet Synchronous Motor**
Z. Li, X. Huang, Z. Chen, T. Shi, and Y. Yan

8204104 **Analysis Accuracy in Positioning Calculation for Three-Degree-of-Freedom Spherical Actuator**
H. Fusayasu, Y. Masuyama, K. Hirata, N. Niguchi, and K. Takahara

8204205 **Design and Analysis of Variable Flux Arc Permanent Magnet Motor With Multiple Excitations**
Z. Pan, S. Fang, L. Qin, Y. Meng, and H. Lin

8204304 **Separation of Winding Losses of Permanent Magnet Motors by Considering Eddy Currents and Parallel Circuit Connections**
K. Yamazaki, T. Furuhashi, and S. Hara

8300804 **Error Fields' Computation in the RFX-mod2 Reversed Field Pinch**
P. Bettini, L. Marrelli, D. Voltolina, R. Cavazzana, G. Marchiori, N. Marconato, R. Specogna, G. Spizzo, R. Torchio, and P. Zanca

8401004 **A Two-Step Darwin Model Time-Domain Formulation for Quasi-Static Electromagnetic Field Calculations**
M. Clemens, F. Kasolis, M.-L. Henkel, B. Kähne, and M. Günther

8401104 **Training Sample Selection Strategy Applied to CNN in Magneto-Thermal Coupled Analysis**
R. Gong and Z. Tang

8401205 **Field-Circuit Coupling and Electromagnetic–Thermal–Mechanical Coupling Analysis of the Single-Stage Fast Linear Transformer Driver Using Time-Domain Finite Integration Technique**
H. Qiu, S. Wang, N. Zhang, J. Zhang, and S. Ning

8401305 **The Movement Characteristics of Space Charge in Flowing Transformer-Oil**
C. Chi, F. Yang, and Z. Ren

8401404 **BEM Computation of the Internal Impedance of Air-Core Inductors Enforcing High-Order Surface Impedance Boundary Conditions**
S. Yin, L. Di Rienzo, X. Ma, and Y. Huangfu

8401504 **Fast Hybrid Approach for Calculation of Losses in Outer Packages of Transformer Core Due to Perpendicular Stray Flux**
Z. Jurković, B. Jurišić, and T. Župan

8600105 **Optimization of Transmitting Coils Based on Uniform Magnetic Field for Unmanned Aerial Vehicle Wireless Charging System**
W. Wang, C. Xu, C. Zhang, and J. Yang

8600205 **Research on Uniform Magnetic Field Compensation Structure of Array Circular Coils for Wireless Power Transfer**
C. Zhang, W. Wang, C. Xu, and J. Yang

8700204 **A Novel Winding Switching Control Strategy for AC/DC Hybrid-Excited Wind Power Generator**
J. Jiang, X. Zhang, X. Zhao, and S. Niu