

# Applied Electromagnetics and Computational Technology

Proceedings of the 4th Japan-Hungary Joint  
Seminar on Applied Electromagnetics in  
Materials and Computational Technology  
Fukuyama, Japan, July 1-3, 1996

Edited by

H. Tsuboi

*Department of Information Engineering  
Fukuyama University, Japan*

and

I. Sebestyen

*Department of Electromagnetic Theory  
Technical University of Budapest, Hungary*

**IOS**  
Press  
**OHM**  
Ohmsha

UNIVERSITÄTSBIBLIOTHEK  
HANNOVER  
TECHNISCHE  
INFORMATIONSBIBLIOTHEK

## Contents

Preface	v
<b>Electric Field</b>	
Optimization in Electric Field Domain, <i>T. Takuma, T. Kawamoto</i>	3
Recent Trend of CAE Technique for Electric Power Apparatus Development, <i>H. Okubo, K. Kato</i>	10
Application of GMRES in Solving 3D Electric Field Problems, <i>S. Sato, T. Yonekawa, F. Takada</i>	20
Modeling of Breakdown Phenomena in Electric Field Based on Finite Element Analysis(FEA), <i>G. Madarász</i>	30
Determination of the Electric Field in an Electrical Precipitator with Impulse Series, <i>T. Barbarics, A. Iványi</i>	40
<b>Magnetic Field and Material Modeling</b>	
Magnetic Fluid Damper, <i>K. Shimada, S. Kamiyama, M. Iwabuchi, K. Okui</i>	53
Strain-Magnetization Properties of Silicon Steel Sheet under the Stress of Plastic Deformation Region, <i>A. Notoji, Y. Minami, M. Hayakawa, R. Kikugawa, A. Saito</i>	61
Magnetic Field in a Single Sheet Tester, <i>A. Iványi</i>	67
Parameter Identification in Preisach Model to Fit Major Loop Data, <i>J. Füzi</i>	77
Improvement of Reluctivity Tensor Expression for Finite Element Analysis, <i>M. Enokizono, N. Soda</i>	83
Two-Dimensional Reluctivity Tensor Under Rotating Field, <i>M. Enokizono, S. Mori, O. Benda</i>	91
<b>Eddy Current</b>	
Some Efficient 3D Finite Models in Eddy Current Nondestructive Evaluation <i>Z. Badics, Y. Matsumoto, S. Kojima, Y. Usui, K. Aoki, F. Nakayasu</i>	101
Eddy Current Analysis of Thin Film Conductor by Modified Time Domain Method, <i>M. Hano, M. Arai</i>	108
Three-Dimensional Finite Element Analysis Using Edge Element, <i>K. Ikeda, H. Tsuboi, F. Kobayashi, T. Misaki</i>	116
<b>Wave Propagation</b>	
Propagation Properties of a Circularly Curved Dielectric Slab Waveguide by Lanczos Reduction, <i>G. Veszely</i>	129

Transmission Through Waveguides with Inhomogeneous Dielectric Close to Singular Frequencies, <i>A. Magos</i>	135
The Whistler-Mode Propagation: Non-longitudinal Solution, <i>O. E. Ferencz</i>	143
<b>Numerical Technique and Mesh Generation</b>	
Fluxoid Dynamics Simulation in Type-II Superconductor, <i>K. Demachi, K. Miya</i>	155
Electromagnetic Field Calculation by Simulation Charges Supported Wavelet-Galerkin Method, <i>A. Gilányi, Z. Chen, K. Miya</i>	162
Electromagnetic Field Modelling of the Ferromagnetic Core of Fluxset Type Sensors, <i>J. Pávó, I. Sebestyén, G. Vértesy, C.S. Daróczy</i>	172
Case Studies on How to Utilize Impedance Boundary Condition in Eddy Current Analysis by BEM, <i>K. Ishibashi</i>	182
Automatic Mesh Generation Using Bubble System, <i>V. Čingoski, S. Noda, R. Murakawa, K. Kaneda, H. Yamashita</i>	190
An Automatic Mesh Generator with Boundary Constraints, <i>T. Ishikawa, X. B. Kong, M. Matsunami</i>	198
Adaptive Mesh Generation with a Dynamic Data Structure, <i>S. Gyimóthy, I. Sebestyén</i>	207
<b>Optimization and Inverse Problems</b>	
Development of Optimal Design Method for Highly Homogeneous and High Field Superconducting Magnets, <i>A. Ishiyama, S. Noguchi</i>	217
Comparison of Various Optimal Design Methods Using Die Press Model, <i>N. Takahashi, K. Muramatsu</i>	223
r-Adaptive Method for Mesh Improvements Using Directly Magnetic Flux Density as an Error Norm Estimator, <i>R. Murakawa, V. Čingoski, K. Kaneda, H. Yamashita</i>	232
Inverse Analysis on Permanent Magnets by Fuzzy Inference, <i>Y. Tsuchida, M. Enokizono</i>	238
<b>Applications of Electromagnetic Field Analysis</b>	
Numerical Analysis of Electromagnetic ID Transmission System by 3-D Finite Element Method, <i>Y. Kawase, T. Mori, K. Hirata, Y. Mitsutake</i>	251
Finite Element Analysis of a Magnetic Circuit in a Loudspeaker, <i>Y. Shiraki, M. Watanabe, S. Koga</i>	257
Numerical Analysis for the Application of Superconductor Rings to Reduce, Ripple, <i>T. Nguyen, I. Sebestyén</i>	265
Temperature Dependent Dynamic Hysteresis in Ferromagnetic Cylinders, <i>J. Fűzi, A. Iványi</i>	275

## Computer Applications

Applications of Tethered Satellite Systems in Space, <i>T. Honma</i>	285
Experimental Evaluation of Properties of DC Elevator Rope Tester, <i>M. Tsuchimoto, T. Machida, T. Honma, Y. Hirama</i>	289
Physical Optics Analysis of ZnSe Aspheric Lens, <i>M. Shiozaki, T. Keishi, M. Kaji, K. Ebata, H. Nanba</i>	293
Optical Solitons in Nonlinear Dispersive Media with Resonant Impurities, <i>S. Takács</i>	302
Surface Phenomena Investigation Due to a Frequent Ophthalmologic Bioimplant, <i>P. Grabner</i>	307
Voltage-Time Characteristics of Power Capacitors and their Computer Drawing, <i>Y. Yoshida, S. Gyouji</i>	315
Some Considerations on Improving the Waveforms of the Class E Switching- Mode Amplifiers, <i>A. Telegdy, B. Molnár</i>	325
Image Restoration by Direct Processing Methods, <i>F. Kobayashi, M. Tomita, H. Tsuboi, M. Tanaka, T. Misaki</i>	335
Finding Elliptic Arcs Based on Geometrical Properties, <i>K. Mori, K. Kawakubo, J. Ikenoue</i>	341
Time Series Prediction by Multi-Layered Neural Networks and Its Applications to Prediction of Hourly Traffic Volume, <i>E. Watanabe, H. Shimizu</i>	351
Evaluation Methods of Dynamic Traffic Information on a Traffic Control System, <i>H. Shimizu, T. Nanba, A. Narumi</i>	358
Dynamic Route Guidance Methods on a Traffic Control System, <i>H. Shimizu, M. Kobayashi, Y. Yonezawa</i>	368
Author Index	375