APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

July 2016
Vol. 31 No. 7
ISSN 1054-4887

The ACES Journal is abstracted in INSPEC, in Engineering Index, DTIC, Science Citation Index Expanded, the Research Alert, and to Current Contents/Engineering, Computing & Technology.

The illustrations on the front cover have been obtained from the research groups at the Department of Electrical Engineering, The University of Mississippi.

THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY
http://aces-society.org

EDITOR-IN-CHIEF

Atef Elsherbeni
Colorado School of Mines, EECS Dept.
Golden, CO 80401, USA

ASSOCIATE EDITORS-IN-CHIEF

Sami Barmada
University of Pisa. ESE Dept.
Pisa, Italy, 56122

Mohamed Bakr
McMaster University, ECE Dept.
Hamilton, ON, L8S 4K1, Canada

Antonio Musolino
University of Pisa
56126 Pisa, Italy

Mohammed Hadi
Kuwait University, EE Dept.
Safat, Kuwait

Abdul Arkadan
Marquette University, ECE Dept.
Milwaukee, WI 53201, USA

Marco Arjona López
La Laguna Institute of Technology
Torreon, Coahuila 27266, Mexico

Alistair Duffy
De Montfort University
Leicester, UK

Paolo Mezzanotte
University of Perugia
I-06125 Perugia, Italy

EDITORIAL ASSISTANTS

Matthew J. Inman
University of Mississippi, EE Dept.
University, MS 38677, USA

Shanell Lopez
Colorado School of Mines, EECS Dept.
Golden, CO 80401, USA

EMERITUS EDITORS-IN-CHIEF

Duncan C. Baker
EE Dept. U. of Pretoria
0002 Pretoria, South Africa

Robert M. Bevensee
Box 812
Alamo, CA 94507-0516, USA

Allen Glisson
University of Mississippi, EE Dept.
University, MS 38677, USA

Ahmed Kishk
Concordia University, ECS Dept.
Montreal, QC H3G 1M8, Canada

David E. Stein
USAF Scientific Advisory Board
Washington, DC 20330, USA

EMERITUS ASSOCIATE EDITORS-IN-CHIEF

Yasushi Kanai
Niigata Inst. of Technology
Kashiwazaki, Japan

Alexander Yakovlev
University of Mississippi, EE Dept.
University, MS 38677, USA

Levent Gurel
Bilkent University
Ankara, Turkey

Ozlem Kilic
Catholic University of America
Washington, DC 20064, USA

Erdem Topsakal
Mississippi State University, EE Dept.
Mississippi State, MS 39762, USA

Fan Yang
Tsinghua University, EE Dept.
Beijing 100084, China

EMERITUS EDITORIAL ASSISTANTS

Khaled ElMaghoub
Trimble Navigation/MIT
Boston, MA 02125, USA

Christina Bonnington
University of Mississippi, EE Dept.
University, MS 38677, USA

Anne Graham
University of Mississippi, EE Dept.
University, MS 38677, USA

Mohamed Al Sharkawy
Arab Academy for Science and Technology, ECE Dept.
Alexandria, Egypt

JULY 2016 REVIEWERS

Ramin Aghajafari
Shahid Ahmed
Md Rezwanul Ahsan
Mohamed Al-Sharkaway
Mohammad Alibakhshi Kenari
Gulam Alsath
Ru-shan Chen
Fangyuan Chen
Michael Chryssomallis
Ali Foudazi
Yongxin Guo
Yan-Jie Guo
Anders Hook
Yasushi Kanai
Mahmood Karami
Sanghoek Kim
Toshiro Kodera
Yingsong Li
Stanislav Maslovski
Ladislau Matekovits
Zicong Mei
Zahéra Mekkioui
Donglin Meng
Fan-Yi Meng
Biswajeet Mukherjee
Mohammad Naser-Moghadasi
Erika Pittella
Anastasis Polycarpou
Hamid Rajabalipanah
Shivraj Rathod
Blaise Ravelo
Abhishek Rawat
Luca Rienzo
Vince Rodriguez
Daniel Rodríguez Prado
Kapil Sharma
Katherine Siakavara
Daniel Sievenpiper
Lauri Sydanheimo
Zhengqing Yun
Xueying Zhang

THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY

JOURNAL

Vol. 31 No. 7 July 2016

TABLE OF CONTENTS

Direction Finding System Using Planar Luneburg Lens
Hao Yu, Xumin Ding, Kuang Zhang, Yuming Wu, and Qun Wu 731

Mutual Coupling Reduction in MIMO Patch Antenna Array Using Complementary Split Ring Resonators Defected Ground Structure
Hany A. Atallah, Adel B. Abdel-Rahman, Kuniaki Yoshitomi, and Ramesh K. Pokharel 737

Experimental Study of Coupling Compensation of Low Profile Spiral Antenna Arrays Response for Direction-finding Applications
Taherah S. Ghazaany, Shron Zhu, Raed A. Alhameed, James M. Noras, Steven M. R. Jones, Tyler V. Buren, Tim Suggett, and Simon Marker 744

Mutual Coupling Reduction in CBS Antenna Arrays by Utilizing Tuned EM-EBG and Non-planar Ground Plane
Saeed Manshari, Farokh Hodjat Kashani, and Gholamreza Moradi 750

Artificial Neural Network based Design of RF MEMS Capacitive Shunt Switches
Zlatica Marinković, Taeyoung Kim, Vera Marković, Marija Milijić, Olivera Pronić-Rančić, Tomislav Ćirić, and Larissa Vietzorreck 756

Vector Hysteresis Modeling in Arbitrarily Shaped Objects Using an Energy Minimization Approach
Amr A. Adly and Salwa K. Abd-El-Hafiz 765

Generalized Spectral Decomposition Approach to a Stochastic Finite Integration Technique Electrokinetic Formulation
Lorenzo Codecasa and Luca Di Rienzo 771

Efficient Representation of Multilevel QR Algorithm for Analysis of Microstrip Structures
Zhaoneng Jiang and Ting Wan 777

Analytical Solution for Line Source Excitation of a PEMC Cylinder Coated with Multilayer Anisotropic Media
Ali Shahi, Mahmoud Fallah, and Ali Abdolali 782

© 2016, The Applied Computational Electromagnetics Society

A Compact Design of Planar Array Antenna with Fractal Elements for Future Generation Applications
Naser Ojaroudiparchin, Ming Shen, and Gert Frølund Pedersen 789

A Compact Design and New Structure of Monopole Antenna with Dual Band Notch Characteristic for UWB Applications
Saeed Hoseyni, Javad Nourinia, Changiz Ghobadi, Sayed V. Masuminia, and Bahman Mohammadi 797

A Compact and Miniaturized Broadband Phase Shifter Using Coupled-lines
Yongle Wu, Siyue Zhou, Xiaochuan Shen, and Yuanan Liu 806

Mode Matching in Microstrip Antenna with both Electric and Magnetic Surface Current on Sidewall in Cavity Model
Fazel Rangriz Rostami, Gholamreza Moradi, and Reza Sarraf Shirazi 812

Design of Lowpass Filter and Lowpass-Highpass Diplexer with LTCC Technology
Chunxia Zhou, Yongxin Guo, and Wen Wu 817

Ferrite-Loaded Substrate Integrated Waveguide Frequency-Agile Bandpass Filter
Qiu Dong Huang and Yu Jian Cheng 823

Simulating CW Light Propagation Through Macroscopic Scattering Media Via Optical Phase Conjugation
Yi-An Huang, Cheng-Hao Tsai, and Snow H. Tseng 829

Analysis of Highly Sensitive Photonic Crystal Biosensor for Glucose Monitoring
Mohamed S. Mohamed, Mohamed Farhat O. Hameed, Nihal F. F. Areed, Mohamed M. El-Okr, and Salah S. A. Obayya 836

Ultra-Wideband Polarization Conversion Metasurface Based on Topology Optimal Design and Geometry Tailor
Sai Sui, Jibao Yu, Hua Ma, Jieqiu Zhang, Jiafu Wang, Zhuo Xu, and Shaobo Qu 843

A Circuit Human Body Model for an Indirect Lightning Strike Analyzed by means of an FDTD Method
Viviane A. Alrim, Stamatios A. Amanatiadis, Antonios X. Lalas, and Christos S. Antonopoulos 847

Numerical Analysis of Thermal Gradient & Magnetic Field using Ferrofluid Cooling
Harry Garg, Sahib Singh, Vipender Singh Negi, Ashish Singh Kharola, and Arun K. Lall 853

© 2016, The Applied Computational Electromagnetics Society