

APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

**May 2023
Vol. 38 No. 5
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 ARC research group at the Department of Electrical Engineering, Colorado School of Mines

Published, sold and distributed by: River Publishers, Alsbjergvej 10, 9260 Gistrup, Denmark

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

EDITORS-IN-CHIEF

Atef Elsherbeni

Colorado School of Mines, EE Dept.
Golden, CO 80401, USA

Sami Barmada

University of Pisa, ESE Dept.
56122 Pisa, Italy

ASSOCIATE EDITORS

Maokun Li

Tsinghua University
Beijing 100084, China

Mauro Parise

University Campus Bio-Medico of Rome
00128 Rome, Italy

Yingsong Li

Harbin Engineering University
Harbin 150001, China

Riyadh Mansoor

Al-Muthanna University
Samawa, Al-Muthanna, Iraq

Lijun Jiang

University of Hong Kong, EEE Dept.
Hong Kong

Shinishiro Ohnuki

Nihon University
Tokyo, Japan

Kubilay Sertel

The Ohio State University
Columbus, OH 43210, USA

Giulio Antonini

University of L Aquila
67040 L Aquila, Italy

Antonio Musolino

University of Pisa
56126 Pisa, Italy

Abdul A. Arkadan

Colorado School of Mines, EE Dept.
Golden, CO 80401, USA

Salvatore Campione

Sandia National Laboratories
Albuquerque, NM 87185, USA

Ibrahim Mahariq

American University of the Middle East
Kuwait and University of
Turkish Aeronautical Association
Turkey

Wei-Chung Weng

National Chi Nan University, EE Dept.
Puli, Nantou 54561, Taiwan

Alessandro Formisano

Seconda Universita di Napoli
81031 CE, Italy

Piotr Gas

AGH University of Science and Technology
30-059 Krakow, Poland

Long Li

Xidian University
Shaanxa, 710071, China

Steve J. Weiss

US Army Research Laboratory
Adelphi Laboratory Center (RDRL-SER-M)
Adelphi, MD 20783, USA

Jiming Song

Iowa State University, ECE Dept.
Ames, IA 50011, USA

Toni Bjorninen

Tampere University
Tampere, 33100, Finland

Santanu Kumar Behera

National Institute of Technology
Rourkela-769008, India

Daniele Romano

University of L Aquila
67100 L Aquila, Italy

Alireza Baghai-Wadji

University of Cape Town
Cape Town, 7701, South Africa

Marco Arjona López

La Laguna Institute of Technology
Torreon, Coahuila 27266, Mexico

Kaikai Xu

University of Electronic Science
and Technology of China
China

Paolo Mezzanotte

University of Perugia
I-06125 Perugia, Italy

Luca Di Rienzo

Politecnico di Milano
20133 Milano, Italy

Lei Zhao

Jiangsu Normal University
Jiangsu 221116, China

Sima Noghanian

Commscope
Sunnyvale, CA 94089, USA

Nunzia Fontana

University of Pisa
56122 Pisa, Italy

Stefano Selleri

DINFO - University of Florence
50139 Florence, Italy

Yu Mao Wu

Fudan University
Shanghai 200433, China

Fatih Kaburcuk

Sivas Cumhuriyet University
Sivas 58140, Turkey

Huseyin Savci

Istanbul Medipol University
34810 Beykoz, Istanbul

Zhixiang Huang

Anhui University
China

Amin Kargar Behbahani

Florida International University
Miami, FL 33174, USA

Laila Marzall

University of Colorado, Boulder
Boulder, CO 80309, USA

EDITORIAL ASSISTANTS

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

Shanell Lopez
Colorado School of Mines, EE 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

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

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

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

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

EMERITUS ASSOCIATE EDITORS

Yasushi Kanai
Niigata Inst. of Technology
Kashiwazaki, Japan

Mohamed Abouzahra
MIT Lincoln Laboratory
Lexington, MA, USA

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

Levent Gurel
Bilkent University
Ankara, Turkey

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

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

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

Alistair Duffy
De Montfort University
Leicester, UK

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

Rocco Rizzo
University of Pisa
56123 Pisa, Italy

Atif Shamim
King Abdullah University of Science and
Technology (KAUST)
Thuwal 23955, Saudi Arabia

William O'Keefe Coburn
US Army Research Laboratory
Adelphi, MD 20783, USA

Mohammed Hadi
Kuwait University, EE Dept.
Safat, Kuwait

Amedeo Capozzoli
Univerita di Naoli Federico II, DIETI
I-80125 Napoli, Italy

Wenxing Li
Harbin Engineering University
Harbin 150001, China

Qiang Ren
Beihang University
Beijing 100191, China

EMERITUS EDITORIAL ASSISTANTS

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

Kyle Patel
Colorado School of Mines, EE Dept.
Golden, CO 80401, USA

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

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

Madison Lee
Colorado School of Mines, EE Dept.
Golen, CO 80401, USA

Allison Tanner
Colorado School of Mines, EE Dept.
Golden, CO 80401, USA

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

MAY 2023 REVIEWERS

Agarwal	Tu-Lu Liang
Yuanxi Cao	Fabrizio Loreto
Jie Chen	Antonino Musolino
Merit Cisneros-Gonzalez	Andrew Peterson
Valentina Consolo	Anna Pietrenko-Dabrowska
Dileepan Dhanasekaran	Qurban Ali Shah
Stavroula Foteinopoulou	Ye Tian
Piotr Gas	Yasuhiro Tsunemitsu
Muyu Hou	Tiago Varum
Pankaj Jha	Shu Wang
Xiao Jian-Kang	Xiaoyan Zhang
Roman Kubacki	

THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

Vol. 38 No. 5

May 2023

TABLE OF CONTENTS

Multi-level Power Series Solution for Large Surface and Volume Electric Field Integral Equation Y. K. Negi, N. Balakrishnan, and S. M. Rao	297
Scattering and Diffraction Evaluated by Physical Optics Surface Current on a Truncated Cylindrical Conductive Cap Mustafa Kara and Mustafa Mutlu	304
Synthesis of Elliptical Antenna Array using Hybrid SSWOA Algorithm D. Prabhakar, K. Srinivas, S. Ratna Spandana, D. Anusha, M. V. Srikanth, and Y. Rama Krishna	309
Application of Artificial Neural Network Base Enhanced MLP Model for Scattering Parameter Prediction of Dual-band Helical Antenna Ahmet Uluslu	316
A Simple Interference and Power-based Direction of Arrival Measuring System for Modern Communication Nga Vu, Thinh Le, Minh Dinh, and Minh Thuy Le	325
A Wideband, High Gain and Low Sidelobe Array Antenna for Modern ETC Systems Lan T. Tran, Chinh D. Khuat, and Lam V. Phi	333
High-isolation Wi-Fi Antenna System based on Metamaterial Zhihao Chen, Ziqin Wang, Fangyuan Chen, Xi Hou, Yonghong Zhou, and Lam Phav	343
Temperature Controlled Terahertz Absorbers based on Omega Resonators Jia-Tong Jing, Wei Song, Ting-Ting Ge, Xin-Qing Sheng, Aliaksei Balmakou, and Sergei Khakhomov	352
Electromagnetic and Thermal Analysis of a 6/4 Induction Switched Reluctance Machine for Electric Vehicle Application Ali Madanimohammadi, Mohammadali Abbasian, Majid Delshad, and Hadi Saghafi	361
Sub-harmonic-based Cost-effective Brushless Wound Rotor Synchronous Machine Topology Syed Sabir Hussain Bukhari and Jong-Suk Ro	371