

**APPLIED
COMPUTATIONAL
ELECTROMAGNETICS
SOCIETY
JOURNAL**

August 2020
Vol. 35 No. 8
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>

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: REGULAR PAPERS

Mohammed Hadi

Kuwait University, EE Dept.
Safat, Kuwait

Alistair Duffy

De Montfort University
Leicester, UK

Wenxing Li

Harbin Engineering University
Harbin 150001, China

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

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

Wei-Chung Weng

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

Alessandro Formisano

Seconda Università di Napoli
81031 CE, Italy

Piotr Gas

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

Long Li

Xidian University
Shaanxa, 710071, China

Marco Arjona López

La Laguna Institute of Technology
Torreon, Coahuila 27266, Mexico

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 Noghianian

University of North Dakota
Grand Forks, ND 58202, USA

Qiang Ren

Beihang University
Beijing 100191, China

Nunzia Fontana

University of Pisa
56122 Pisa, Italy

Atif Shamim

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

Stefano Selleri

DINFO – University of Florence
50139 Florence, Italy

ASSOCIATE EDITORS: EXPRESS PAPERS

Lijun Jiang

University of Hong Kong, EEE Dept.
Hong, Kong

Shinichiro Ohnuki

Nihon University
Tokyo, Japan

Kubilay Sertel

The Ohio State University
Columbus, OH 43210, USA

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

Amedeo Capozzoli

Univerita di Napoli Federico II, DIETI
I-80125 Napoli, Italy

Yu Mao Wu

Fudan University
Shanghai 200433, China

Maokun Li

Tsinghua University, EE Dept.
Beijing 100084, China

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

Madison Le

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

Allison Tanner

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

Allen Glisson

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

Ahmed Kishk

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

Robert M. Bevensee

Box 812
Alamo, CA 94507-0516, USA

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

Alexander Yakovlev

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

Levent Gurel

Bilkent University
Ankara, Turkey

Mohamed Abouzahra

MIT Lincoln Laboratory
Lexington, MA, USA

Ozlem Kilic

Catholic University of America
Washington, DC 20064, USA

Erdem Topsakal

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

Sami Barmada

University of Pisa, ESE Dept.
56122 Pisa, Italy

Fan Yang

Tsinghua University, EE Dept.
Beijing 100084, China

Rocco Rizzo

University of Pisa
56123 Pisa, Italy

William O'Keefe Coburn

US Army Research Laboratory
Adelphi, MD 20783, USA

EMERITUS EDITORIAL ASSISTANTS

Khaled ElMaghoub

Trimble Navigation/MIT
Boston, MA 02125, USA

Christina Bonnington

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

Kyle Patel

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

AUGUST 2020 REVIEWERS: REGULAR PAPERS

Iftikhar Ahmed
Marco Arjona
Sami Barmada
John Borchardt
Vedula Chakravarthy
Massimo Donelli
Ping Du
Alistair Duffy
Pavel Hazdra
Tianqi Jiao
William Kefauver
Aymen Khaleel
Nikolai Kolev
Neelam Sanjeev Kumar
Sathis Kumar
K. Kumarasamy
Sergio Ledesma
Alberto Leggieri

German Leon
Zahéra Mekkioui
Antonio Orlandi
Panagiotis Papakanellos
Milos Pavlovic
Mirjana Peric
Sobhan Roshani
Babajide Salau
Stefano Selleri
Farzin Shama
Junwu Tao
Anilkumar Tirunagari
Bojan Trkulja
Qian Xu
Ravindra Yadav
Guohui Yang
Min Zhang

AUGUST 2020 REVIEWERS: EXPRESS PAPERS

Tuan Li
Naobumi Michishita

Christopher Trueman

TABLE OF CONTENTS – REGULAR PAPERS

A Straight-Forward Method of Moments Procedure to Solve the Time Domain Integral Equation Applicable to PEC Bodies via Triangular Patch Modeling Sadasiva M. Rao.....	843
A Novel Method for Output Characteristics Calculation of Electromagnetic Devices using Multi-kernel RBF Neural Network Feng Ding, Yunyun Gao, and Jianhui Tian.....	855
A Modified Adaptive Integral Method for Analysis of Large-scale Finite Periodic Array Mingxuan Zheng, Huiling Zhao, and Zhonghui Zhao	864
Improving the Efficiency of Hybrid Boundary Element Method for Electrostatic Problems Solving Mirjana T. Perić, Saša S. Ilić, Ana N. Vučković, and Nebojša B. Raičević	872
Comprehensively Efficient Analysis of Nonlinear Wire Scatterers Considering Lossy Ground and Multi-tone Excitations Amir Bahrami and Saeed Reza Ostadzadeh.....	878
A Compact Eight-port CPW-fed UWB MIMO Antenna with Band-notched Characteristic Li-Yan Chen, Wei-Si Zhou, Jing-Song Hong, and Muhammad Amin.....	887
Design of Polarization Reconfigurable Patch Antenna for Wireless Communications Anumuthu Priya, S. Kaja Mohideen, and Manavalan Saravanan	893
Design of Dual-Band Printed-Dipole Array Antenna with Omni-directional Radiation Behaviour Jean-Marie Floch, Ameni Mersani, Bandar Hakim, Khaled Sedraoui, and Hatem Rmili	899
Multi-Mode Narrow-Frame Antenna for 4G/5G Metal-Rimmed Mobile Phones Ming Yang, Yu-Fa Sun, and Tong-Qing Liao	908
Realization of Modified Elliptical Shaped Dielectric Lens Antenna for X Band Applications with 3D Printing Technology Aysu Belen and Evrim Tetik.....	916

Slot Filling Factor Calculation and Electromagnetic Performance of Single Phase Electrically Excited Flux Switching Motors Bakhtiar Khan, Faisal Khan, Wasiq Ullah, Muhammad Umair, and Shahid Hussain	922
CPW-Fed Wide Band Micro-machined Fractal Antenna with Band-notched Function Ashwini Kumar and Amar Partap Singh Pharwaha	929
Compact Multi-Mode Filtering Power Divider with High Selectivity, Improved Stopband and In-band Isolation Zhenyao Qian, Yuan Chen, Chunmei Feng, and Wei Wang	936
Analysis of Crosstalk Problem in Multi-Twisted Bundle of Multi-Twisted Wire Based on BSAS-BP Neural Network Algorithm and Multilayer Transposition Method Chao Huang, Yang Zhao, Wei Yan, Qiangqiang Liu, Jianming Zhou, Zhaojuan Meng, and Abdul Mueed	941
Omega-Shaped Tag Antenna with Inductively-Coupled Feeding Using U-Shaped Stepped-Impedance Resonators for RFID Applications Adam R. H. Alhawari, Abdulkarem H. M. Almawgani, Hisham Alghamdi, Ayman T. Hindi, Tale Saeidi, and Alyani Ismail	951
Scattering Characteristic Extraction and Recovery for Multiple Targets Based on Time Frequency Analysis Xiangwei Liu, Jianzhou Li, Yi Zhu, and Shengjun Zhang.....	962

TABLE OF CONTENTS – EXPRESS PAPERS

Wideband Microstrip Patch Antennas with Transverse Electric Modes Tanzeela Mitha and Maria Pour	971
Design of a New Wideband Single-Layer Reflective Metasurface Unit Cell for 5G-Communication Muhammad A. Qureshi, Abdul Aziz, Asjad Amin, Hafiz Faiz Rasool, and Faisal Hayat	975