

**APPLIED  
COMPUTATIONAL  
ELECTROMAGNETICS  
SOCIETY  
JOURNAL**

January 2019  
Vol. 34 No. 1  
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

**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

**Rocco Rizzo**

University of Pisa  
56123 Pisa, 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

## 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

**Kyle Patel**

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

**Madison Le**

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

**Shanell Lopez**

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

**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

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

## JANUARY 2019 REVIEWERS: REGULAR PAPERS

**Hany Atallah**  
**Nikolay Atanasov**  
**Ahmed Attiya**  
**Herve Aubert**  
**Emine Avsar Aydin**  
**Zsolt Badics**  
**Lahcene Boukelkoul**  
**Madhav BTP**  
**Scott Burnside**  
**Ali Cetin**  
**Fangyuan Chen**  
**Dajun Cheng**  
**Hosam El-Ocla**  
**Grant Ellis**  
**Gregor Ergaver**  
**Ali Hazeri**

**Miroslav Joler**  
**Fatih Kaburcuk**  
**Robin Kalyan**  
**Tarun Kumar**  
**George Kyriacou**  
**Micaela Liberti**  
**Qun Lou**  
**Mingyu Lu**  
**Peng Lv**  
**Riyadh Mansoor**  
**Zahra Manzoor**  
**Ricardo Matias**  
**Ahmed Mobashsher**  
**Arkadiusz Mystkowski**  
**Syeda Naqvi**  
**Guangdong Pan**

**Mark Panitz**  
**Kyle Patel**  
**Andrew Peterson**  
**Rashid Saleem**  
**A. Salinas**  
**Vitawat Sittakul**  
**Chalasan Subba Rao**  
**Sellakkutti Suganthi**  
**Mehmet Tabakcioglu**  
**SureshKumar TR**  
**Ioannis Vardiambasis**  
**Julia Wolff**  
**Qianyin Xiang**  
**Qian Xu**  
**Fan Yang**  
**Sun Zhe**

TABLE OF CONTENTS – REGULAR PAPERS

Efficient TLM-Based Approach for Compact Modeling of Anisotropic Materials and Composites  
Miloš D. Kostić, Nebojša S. Dončov, Zoran Ž. Stanković, and John D. Paul ..... 1

Spatial Partitioning Strategy for Parallelization of MLFMA with Reduced Communication  
Xunwang Zhao, Chang Zhai, Zhongchao Lin, Yu Zhang, and Qifeng Liu ..... 11

Evaluation of Temperature Elevation in Human Ocular Tissues due to Wireless Eyewear Devices  
Junqing Lan and Guohong Du..... 17

An Analytical Method for Calculating Radiated Emission of Discontinuous Penetrating Cable  
Bing-Xue Zhang, Pei Xiao, Dan Ren, and Ping-An Du..... 25

Approximated Solutions on the Electromagnetic Field in Near Zone Generated by a  
Horizontal Electric Dipole on the Planar Surface of the Anisotropic Rock  
Tingting Gu, Honglei Xu, and Kai Li ..... 33

Attenuation in Lossy Circular Waveguides  
Kim Ho Yeap, Eric Vun Shiung Wong, Humaira Nisar, Kazuhiro Hirasawa,  
and Takefumi Hiraguri ..... 43

Design of Dual-Band Miniaturized Frequency Selective Surface Using Branched  
Tortuous Structure  
Ning Liu, Xianjun Sheng, Xiang Gao, Chunbo Zhang, and Dongming Guo ..... 49

A Varactor Loaded Tunable Dual-band Left-Handed Metamaterial  
Si Li, Wenhua Yu, Atef Z. Elsherbeni, Wenxing Li, and Yunlong Mao ..... 56

Analysis of Random Nonuniform Transmission Line Response under Plane-Wave Illumination  
with a Perturbation Decomposition-Polynomial Chaos Expansion Method  
Jinpeng Yang, Xiaoying Sun, Yu Zhao, Jian Chen, and Hanqing Wang..... 64

Radar Target Recognition by Machine Learning of K-Nearest Neighbors Regression on  
Angular Diversity RCS  
Kun-Chou Lee ..... 75

FMCW Chirp Diversity for Mutual Interference Mitigation in Short-range Automotive  
Radars under Realistic Traffic Model  
Md Anwar Hossain, Ibrahim Elshafiey, and Abdulhameed Al-Sanie ..... 82

Time-Domain Spectral Inversion Method for Characterization of Subsurface Layers in Ground-Penetrating-Radar (GPR) Applications Zohre Motevalli and Bijan Zakeri .....	93
Mutual Coupling Reduction Between Patch Antenna and Microstrip Transmission Line by Using Defected Isolation Wall Yuting Zhao, Yingsong Li, Wanlu Shi, and Wenhua Yu.....	100
A Novel Beam-Steerable Antenna Using HIS-SWG Reconfigurable Artificial Ground Structure You-Feng Cheng, Xiao Ding, Wei Shao, and Cheng Liao .....	107
A Metallic Patch Antenna Using a Simple Short Probe for Improving Impedance Match Bandwidth Ziyang Wang, Zhao Yang, and Yingzeng Yin.....	115
Design of Reconfigurable Ultrawide Band Antenna with Switchable Single/Dual/Triple Band Notch Functions Jian Dong, Shan Wang, and Guoqiang Hu.....	121
Design and Optimization of Slotted Micro-Machined Patch Antenna Using Composite Substrate Ashish Kumar and Amar Partap Singh .....	128
Compact Dual-band Hybrid-Fractal MIMO System for UMTS and LTE Mobile Applications Prabhu Palanisamy and Malarvizhi Subramani.....	135
Compact Wideband Filtering Power Dividers Based on Short-Circuited Stubs Gaoya Dong, Bo Zhang, Weimin Wang, and Yuanan Liup.....	141
Spatial Domain Generation of Random Surface Using Savitzky-Golay Filter for Simulation of Electromagnetic Polarimetric Systems Shimaa A. M. Soliman, Asmaa E. Farahat, Khalid F. A. Hussein, and Abd-El-Hadi A. Ammar .....	148
FEMC Performance of Pyramidal Microwave Absorber using Sugarcane Baggasse and Rubber Tire Dust at 1 GHz to 18 GHz Frequencies Liyana Zahid, Muzammil Jusoh, R.Badlishah Ahmad, Thennarasan Sabapathy, Mohd Fareq Malek, Muhammad Ramlee Kamarudin, Mohd Najib Yasin, and Mohamed Nasrun Osman .....	162
Role of Surface Geometric Patterns and Parameters in the Dispersion Relations of Spoof Surface Plasmon Polaritons at Microwave Frequency Rana Sadaf Anwar, Lingfeng Mao, and Huansheng Ning .....	172
LCP Plane Wave Scattering by a Chiral Elliptic Cylinder Embedded in Infinite Chiral Medium AbdelKader Hamid.....	180

A Magneto-Rheological Brake Excited by Permanent Magnets  
Antonino Musolino, Marco Raugi, Rocco Rizzo, Luca Sani, and Efrén Diez-Jimenez ..... 186

A New Compact Finline OMT Based on Multi-Section Transformer  
Yaqing Yu, Wen Jiang, Shuai Zhang, Shuxi Gong, and Tong Cheng ..... 192