

# **APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL**

June 2018  
Vol. 33 No. 6  
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-IN-CHIEF: REGULAR PAPERS**

**Mohammed Hadi**  
Kuwait University, EE Dept.  
Safat, Kuwait

**Antonio Musolino**  
University of Pisa  
56126 Pisa, Italy

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

**Alistair Duffy**  
De Montfort University  
Leicester, UK

**Abdul A. Arkadan**  
Colorado School of Mines, EE Dept.  
Golden, CO 80401, USA

**Paolo Mezzanotte**  
University of Perugia  
I-06125 Perugia, Italy

**Wenxing Li**  
Harbin Engineering University  
Harbin 150001, China

**Salvatore Campione**  
Sandia National Laboratories  
Albuquerque, NM 87185, USA

**Luca Di Rienzo**  
Politecnico di Milano  
20133 Milano, Italy

**Maokun Li**  
Tsinghua University  
Beijing 100084, China

**Wei-Chung Weng**  
National Chi Nan University, EE Dept.  
Puli, Nantou 54561, Taiwan

**Rocco Rizzo**  
University of Pisa  
56123 Pisa, Italy

**Mauro Parise**  
University Campus Bio-Medico of Rome  
00128 Rome, Italy

**Sima Noghanian**  
University of North Dakota  
Grand Forks, ND 58202, USA

**ASSOCIATE EDITORS-IN-CHIEF: EXPRESS PAPERS**

**Lijun Jiang**  
University of Hong Kong, EEE Dept.  
Hong Kong

**Steve J. Weiss**  
US Army Research Laboratory  
Adelphi Laboratory Center (RDRL-SER-M)  
Adelphi, MD 20783, USA

**Amedeo Capozzoli**  
Università di Napoli Federico II, DIETI  
I-80125 Napoli, Italy

**Shinichiro Ohnuki**  
Nihon University  
Tokyo, Japan

**William O'Keefe Coburn**  
US Army Research Laboratory  
Adelphi Laboratory Center (RDRL-SER-M)  
Adelphi, MD 20783, USA

**Yu Mao Wu**  
Fudan University  
Shanghai 200433, China

**Kubilay Sertel**  
The Ohio State University  
Columbus, OH 43210, USA

**Jiming Song**  
Iowa State University, ECE Dept.  
Ames, IA 50011, USA

**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

**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 EDITORS-IN-CHIEF**

## EMERITUS ASSOCIATE EDITORS-IN-CHIEF

<b>Yasushi Kanai</b> Niigata Inst. of Technology Kashiwazaki, Japan	<b>Mohamed Abouzahra</b> MIT Lincoln Laboratory Lexington, MA, USA	<b>Alexander Yakovlev</b> University of Mississippi, EE Dept. University, MS 38677, USA
<b>Levent Gurel</b> Bilkent University Ankara, Turkey	<b>Sami Barmada</b> University of Pisa, ESE Dept. 56122 Pisa, Italy	<b>Ozlem Kilic</b> Catholic University of America Washington, DC 20064, USA
<b>Erdem Topsakal</b> Mississippi State University, EE Dept. Mississippi State, MS 39762, USA		<b>Fan Yang</b> Tsinghua University, EE Dept. Beijing 100084, China

## EMERITUS EDITORIAL ASSISTANTS

<b>Khaled ElMaghoub</b> Trimble Navigation/MIT Boston, MA 02125, USA	<b>Christina Bonnington</b> University of Mississippi, EE Dept. University, MS 38677, USA
<b>Anne Graham</b> University of Mississippi, EE Dept. University, MS 38677, USA	<b>Mohamed Al Sharkawy</b> Arab Academy for Science and Technology, ECE Dept. Alexandria, Egypt

## JUNE 2018 REVIEWERS: REGULAR PAPERS

<b>Rusan Barik</b>	<b>Miaomiao Ma</b>
<b>Adalbert Beyer</b>	<b>Peyman Mahouti</b>
<b>Hai-tao Chen</b>	<b>Mahdi NaghshvarianJahromi</b>
<b>Xibi Chen</b>	<b>Arash Nemat</b>
<b>Zhe Chen</b>	<b>Mohammad Neshati</b>
<b>Klaus Debes</b>	<b>Jagdishkumar Rathod</b>
<b>Qian Ding</b>	<b>Blaise Ravelo</b>
<b>Nebojsa Doncov</b>	<b>Kubilay Sertel</b>
<b>Zhenhong Fan</b>	<b>Yury Shestopalov</b>
<b>Zhengwei Hao</b>	<b>Yan Shi</b>
<b>Ahmad Hosseini</b>	<b>Bruno Stupfel</b>
<b>Lijun Jiang</b>	<b>Christopher Trueman</b>
<b>Zhaoneng Jiang</b>	<b>Hubert Trzaska</b>
<b>Bin Li</b>	<b>Zuo-Min Tsai</b>
<b>Gaosheng Li</b>	<b>Zhonggen Wang</b>
<b>Haihui Li</b>	<b>Li Wu</b>
<b>Jian Li</b>	<b>Jinpeng Yang</b>
<b>Teng Li</b>	<b>Ali Yapar</b>
<b>Xin Li</b>	<b>Huan Zhang</b>

## JUNE 2018 REVIEWERS: EXPRESS PAPERS

<b>Maokun Li</b>	<b>Edward Rothwell</b>
<b>Ladislau Matekovits</b>	<b>Zvonimir Sipus</b>
<b>Gregory Mitchell</b>	<b>Steven Weiss</b>
<b>Quang Nguyen</b>	

# THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

Vol. 33 No. 6

June 2018

## TABLE OF CONTENTS – REGULAR PAPERS

Extrema of Two-Port Network Transducer Power Gain and Voltage Gain Under Varying Port Terminations: Semi-Analytical Method and Application to Biotelemetry System Toni Björninens .....	561
First and Second Order Mur Type ABCs for DNG Media Ayşegül Pekmezci, Ercan Topuz, and Levent Sevgi.....	569
Fast Finite-Difference Calculation of Eddy Currents in Thin Metal Sheets James R. Nagel .....	575
Accuracy of Finite Element Approximations for Two-dimensional Time-harmonic Electromagnetic Boundary Value Problems Involving Non-conducting Moving Objects with Stationary Boundaries Praveen K. Ramakrishnan and Mirco Raffetto .....	585
An Iterative CN-Leapfrog Scheme Based Hybrid Implicit–Explicit Discontinuous Galerkin Finite-Element Time-Domain Method for Analysis of Multiscale Problems Min Li, Xiaodong Ye, Fu Xu, and Yi Ting Yang .....	597
Tunable Band-Notched UWB Antenna from WLAN to WiMAX with Open Loop Resonators using Lumped Capacitors Wael A. E. Ali and Ahmed A. Ibrahim .....	603
A Differential CPW-fed Ultra-wideband Antenna with Dual Notched Bands Jinhai Liu, Zhao-Yang Tang, and Ying-Zeng Yin .....	610
Analysis and Synthesis of Equilateral Triangular Ring Microstrip Antenna using Support Vector Machine Ahmet Kayabasi .....	616
Design and Analysis of Ring-Focus Reflector Antenna using Method of Moments Solution of Electric Field Integral Equation I. Ismatullah, Ghulam Ahmad, and Shafaat A. K. M. Ali .....	625
Compact Zeroth-order Resonance Loaded Microstrip Antenna with Enhanced Bandwidth for Wireless Body Area Networks/Brain Activity Detection Kai Sun, Lin Peng, Quan Li, Xiaoming Li, and Xing Jiang .....	631

Electromagnetic Shielding Effectiveness Calculation for Cascaded Wire-Mesh Screens with Glass Substrate Hany M. El-Maghrabi .....	641
A General Equivalent Model for Multi-Coil Wireless Power Transfer System Analysis and its Application on Compensation Network Design Yanjie Guo, Lifang Wang, and Chenglin Liao .....	648
LF Sky Wave Propagation Excited by a Horizontal Electric Dipole Towards Understanding of Its Radiation Mechanism Honglei Xu, Tingting Gu, Juan Zheng, and Kai Li .....	657
Radar Detection of Plasma-Covered Reentry Object Based on Crossed Two-Component LFM Signal Xuyang Chen, Fangfang Shen, Yanming Liu, Xiaoping Li, and Wei Ai .....	665
The Investigation of Backscattering Characteristics of 3-D Local Sea Surface with Time-varying Overturning Wave Crest Xiao Meng, Lixin Guo, Shuirong Chai, and Yongchang Jiao .....	675
A Propagation Model for Rough Sea Surface Conditions using the Parabolic Equation with the Shadowing Effect Mengda Cui, Hao Cha, and Bin Tian .....	683
A Novel Tunable Comline Bandpass Filter Based on External Quality Factor and Internal Coupling Tunings Lixue Zhou, Shijie Liu, Jun Duan, and Min Xun.....	690
FE Analysis on Temperature, Electromagnetic Force and Load Capacities of Imperfect Assembled GIB Plug-in Connectors Xiangyu Guan, Xin Wei, Xianyong Song, Naiqiu Shu, and Hui Peng .....	697

#### **TABLE OF CONTENTS – EXPRESS PAPERS**

Comparison of Three Body Models of Different Complexities in Modelling of Equal-Sized Dipole and Folded Dipole Wearable Passive UHF RFID Tags Toni Björninien .....	706
N-Shaped Frequency Reconfigurable Antenna with Auto Switching Unit Arun Vijayan, L. R. KarlMarx, K. J. Jegadish Kumar, and Christy C. Vimlitha .....	710
Study of Phase and Patterns Characteristics of a Sub-Wavelength Broadband Reflectarray Unit Element Based on Triple Concentric Circular-Rings Javad Nourinia, Changiz Ghobadi, Bahman Mohammadi, and Farzad Alizadeh.....	714