

# IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION

A PUBLICATION OF THE IEEE ANTENNAS AND PROPAGATION SOCIETY



JULY 2016

VOLUME 64

NUMBER 7

IETPAK

(ISSN 0018-926X)

## PART I OF TWO PARTS

### SPECIAL ISSUE ON THEORY AND APPLICATIONS OF CHARACTERISTIC MODES

---

Guest Editorial .....	B. K. Lau, D. Manteuffel, H. Arai, and S. V. Hum	2590
<i>Computation of Characteristic Modes</i>		
Computational Analysis and Verifications of Characteristic Modes in Real Materials .....	Z. T. Miers and B. K. Lau	2595
Large-Scale Characteristic Mode Analysis With Fast Multipole Algorithms .....	Q. I. Dai, J. Wu, H. Gan, Q. S. Liu, W. C. Chew, and W. E. I. Sha	2608
<i>Techniques for Characteristic Mode Analysis</i>		
Eigenvalue Crossing Avoidance in Characteristic Modes .....	K. R. Schab, J. M. Outwater, Jr., M. W. Young, and J. T. Bernhard	2617
Advanced Eigenvalue Tracking of Characteristic Modes .....	E. Safin and D. Manteuffel	2628
Computation of the <i>Q</i> Limits for Arbitrary-Shaped Antennas Using Characteristic Modes .....	J. Chalas, K. Sertel, and J. L. Volakis	2637
<i>Antenna and Antenna Array Designs</i>		
Bandwidth Enhancement of Platform-Mounted HF Antennas Using the Characteristic Mode Theory .....	T.-Y. Shih and N. Behdad	2648
MIMO Mobile Handset Antenna Merging Characteristic Modes for Increased Bandwidth .....	C. Deng, Z. Feng, and S. V. Hum	2660
Systematic Shape Optimization of Symmetric MIMO Antennas Using Characteristic Modes .....	B. Yang and J. J. Adams	2668
Design of a Wideband, Tunable Four-Port MIMO Antenna System With High Isolation Based on the Theory of Characteristic Modes .....	M. Bouezzeddine and W. L. Schroeder	2679
Compact Multimode Multielement Antenna for Indoor UWB Massive MIMO .....	D. Manteuffel and R. Martens	2689
Null-Steering Antenna Design Using Phase-Shifted Characteristic Modes .....	F. A. Dicandia, S. Genovesi, and A. Monorchio	2698
<i>Antenna and Scattering Analysis</i>		
Computing and Visualizing the Input Parameters of Arbitrary Planar Antennas via Eigenfunctions .....	B. Yang and J. J. Adams	2707

---

(Contents Continued on Page 2589)

*(Contents Continued from Front Cover)*

---

Analysis of Miniature Metamaterial and Magnetodielectric Arbitrary-Shaped Patch Antennas Using Characteristic Modes: Evaluation of the <i>Q</i> Factor .....	<i>M. H. Rabah, D. Seetharamdoo, and M. Berbineau</i>	2719
Reduction in Out-of-Band Antenna Coupling Using Characteristic Mode Analysis .....	<i>Q. Wu, W. Su, Z. Li, and D. Su</i>	2732
Electromagnetic Resonances of Individual Single-Walled Carbon Nanotubes With Realistic Shapes: A Characteristic Modes Approach .....	<i>A. M. Hassan, F. Vargas-Lara, J. F. Douglas, and E. J. Garboczi</i>	2743
Characteristic Mode Analysis of a Class of Empirical Design Techniques for Probe-Fed, U-Slot Microstrip Patch Antennas .....	<i>M. Khan and D. Chatterjee</i>	2758

---