

---

**ELECTROMAGNETIC  
WAVES                      PIERL 14**

---

**Progress**

**In**

**Electromagnetics**

**Research Letters**

© 2010 EMW Publishing. All rights reserved.

No part of this publication may be reproduced. Request for permission should be addressed to the Publisher.

All inquiries regarding copyrighted material from this publication, manuscript submission instructions, and subscription orders and price information should be directed to: EMW Publishing, P. O. Box 425517, Kendall Square, Cambridge, Massachusetts 02142, USA.

E-ISSN 1937-6480

---

**ELECTROMAGNETIC  
WAVES**                      **PIERL 14**

---

**Progress**

**In**

**Electromagnetics  
Research Letters**

**Chief Editor: Weng Cho Chew**

EMW Publishing  
Cambridge, Massachusetts, USA



## CONTENTS

### **EFFICIENT $4 \times 4$ PROPAGATION MATRIX METHOD USING A FOURTH-ORDER SYMPLECTIC INTEGRATOR FOR THE OPTICS OF ONE-DIMENSIONAL CONTINUOUS INHOMOGENEOUS MATERIALS**

*Z. Lu*

1	Introduction . . . . .	1
2	The Fourth-order Symplectic Propagation Matrix . . . . .	3
3	Numerical Results . . . . .	6
4	Conclusion . . . . .	8

### **DOUBLE-SIDE RADIATING LEAKY-WAVE ANTENNA BASED ON COMPOSITE RIGHT/LEFT-HANDED COPLANAR-WAVEGUIDE**

*C.-Y. Liu, Q.-X. Chu, and J.-Q. Huang*

1	Introduction . . . . .	11
2	Leaky-wave Dispersion of One Periodic Structure . . . . .	13
3	Double-side Radiating Leaky-wave Antenna . . . . .	16
4	Conclusion . . . . .	18

### **USING NEURAL NETWORKS FOR FAULT DETECTION IN PLANAR ANTENNA ARRAYS**

*D. Vakula and N. V. S. N. Sarma*

1	Introduction . . . . .	21
2	Theory . . . . .	22
3	Artificial Neural networks . . . . .	25
4	Results & Discussion . . . . .	26
5	Conclusions . . . . .	29

### **DESIGN OF MODIFIED MICROSTRIP COMBLINE ARRAY ANTENNA FOR AVIONIC APPLICATION**

*A. Pirhadi and G. A. Jafarabadi*

1	Introduction . . . . .	31
2	Radiation Characteristics of Conventional Microstrip Compline Array Antenna . . . . .	32

3	Modified Microstrip Comblines Array Antenna and Its Radiation Characteristics .....	33
4	Design of Nonuniform Modified Comblines Microstrip Antenna	36
5	Experimental Results .....	37
6	Conclusion .....	39

**SPECTRAL SWITCH OF LIGHT INDUCED BY SCATTERING FROM A SYSTEM OF PARTICLES**

*T. Wang and D. Zhao*

1	Introduction .....	41
2	Theory .....	42
3	Spectral Switch of Light Scattered from a Two Particles System	46
4	Conclusion .....	47

**STANDING WAVE EFFECTS IN MICROWAVE ELLIPSOMETRY**

*L. R. Lawson and H. A. Yousif*

1	Introduction .....	51
2	The Ellipsometer .....	53
3	Calculation of Standing Wave Effects .....	54
4	Experimental .....	55
5	Conclusion .....	58

**A LOW-PROFILE MONOPOLE ANTENNA EMBEDDED WITH A RESONANT SLOT**

*W.-J. Liu, Q.-X. Chu, and L.-H. Ye*

1	Introduction .....	59
2	Design Considerations of the Antenna .....	60
3	Results and Discussion .....	62
4	Conclusion .....	66

**COMPACT BANDPASS FILTER USING FOLDED LOOP RESONATOR WITH HARMONIC SUPPRESSION**

*B. Jitha, P. C. Bybi, C. K. Aanandan, P. Mohanan and K. Vasudevan*

1	Introduction .....	69
2	Bandpass Filter Design .....	70
3	Conclusion .....	77

**REMOTE SENSING WITH TDMF RADAR: SOME PRELIMINARY RESULTS**

*S. Yan, X. B. Wu, and Z. Z. Chen*

1	Introduction . . . . .	79
2	Advantages of TDMF radar . . . . .	80
3	Experiment Setup . . . . .	81
4	Results and Conclusion . . . . .	84
5	Summary and Concluding Remarks . . . . .	87

**A NOVEL DUALITY BETWEEN PERMEABILITY AND PERMITTIVITY IN A CONCENTRIC SPHERE**

*N. Vaseghi, A. Abdolali, and H. Oraizi*

1	Introduction . . . . .	91
2	Numerical Procedure . . . . .	92
3	Proof of the Theorem . . . . .	95
4	Numerical Examples . . . . .	96
5	Conclusion . . . . .	99

**A MEANDER PDA ANTENNA FOR GSM/DCS/PCS/UMTS/WLAN APPLICATIONS**

*W.-S. Chen and B.-Y. Lee*

1	Introduction . . . . .	101
2	Antenna Design . . . . .	102
3	Experimental Results and Discussion . . . . .	104
4	Conclusion . . . . .	108

**COMPACT QUINTUPLE-MODE UWB BANDPASS FILTER WITH GOOD OUT-OF-BAND REJECTION**

*H.-W. Deng, Y.-J. Zhao, X.-S. Zhang, L. Zhang, and S.-P. Gao*

1	Introduction . . . . .	111
2	Quintuple-mode UWB Filter . . . . .	113
3	Simulated and Measured Results . . . . .	115
4	Conclusions . . . . .	115

**COMPACT DUAL-MODE OPEN STUB-LOADED  
RESONATOR AND BPF**

*H.-W. Deng, Y.-J. Zhao, X.-S. Zhang, L. Zhang, and W. Zhao*

1	Introduction . . . . .	119
2	Proposed Dual-mode Resonator and BPF . . . . .	121
3	Experimental Verification . . . . .	123
4	Conclusion . . . . .	123

**COMPLEMENTARY SPLIT RING RESONATORS OF  
LARGE STOP BANDWIDTH**

*S. N. Khan, X. G. Liu, L. X. Shao, and Y. Wang*

1	Introduction . . . . .	127
2	Design and Simulation . . . . .	128
3	Results and Discussion . . . . .	129
4	Conclusion . . . . .	131

**A NOVEL LINEAR EM RECONSTRUCTION  
ALGORITHM WITH PHASELESS DATA**

*H. Zheng, M. Z. Wang, Z. Q. Zhao, and L. L. Li*

1	Introduction . . . . .	133
2	PDB-MRCSI Method Description . . . . .	134
3	Numerical Examples . . . . .	139
4	Conclusion . . . . .	144

**DESIGN OF A DUAL-MODE DUAL-BAND FILTER  
USING STEPPED IMPEDANCE RESONATORS**

*L. Guo, Z.-Y. Yu, and L. Zhang*

1	Introduction . . . . .	147
2	Dual-mode Dual-band Bandpass Filter with $\lambda/2$ SIRs . . . . .	148
3	Conclusion . . . . .	153

**NOVEL IMPEDANCE MATCHING SCHEME FOR  
PATCH ANTENNAS**

*X.-D. Huang, X.-H. Jin, and C.-H. Cheng*

1	Introduction . . . . .	155
2	Antenna Design . . . . .	156
3	Conclusion . . . . .	161



**A NOVEL COMPACT UWB NOTCH-FILTER ANTENNA WITH A DUAL-Y-SHAPED SLOT**

*J.-B. Jiang, Z.-H. Yan, and C. Wang*

1	Introduction . . . . .	165
2	Antenna Design . . . . .	166
3	Results and Discussion . . . . .	168
4	Conclusion . . . . .	169

**W-CDMA RF FILTER WITH 60 MHz BANDWIDTH BASED ON PARALLEL CONNECTED BAW STACKED CRYSTAL FILTERS**

*E. Corrales*

1	Introduction . . . . .	171
2	Stacked Crystal Filters . . . . .	172
3	Parallel Connected SCFs Topology . . . . .	173
4	Filter Response . . . . .	176
5	Conclusions . . . . .	177

**NOVEL UWB BPF USING QUINTUPLE-MODE STUB-LOADED RESONATOR**

*H.-W. Deng, Y.-J. Zhao, L. Zhang, X.-S. Zhang, and W. Zhao*

1	Introduction . . . . .	181
2	Quintuple-mode Stub-loaded Resonator . . . . .	182
3	Quintuple-mode UWB Filter . . . . .	186
4	Conclusions . . . . .	186