

---

**ELECTROMAGNETIC  
WAVES                      PIERC 01**

---

**Progress**

**In**

**Electromagnetics**

**Research C**

© 2008 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 1937-8718

---

**ELECTROMAGNETIC  
WAVES                      PIERC 01**

---

**Progress**

**In**

**Electromagnetics**

**Research C**

**Chief Editor: J. A. Kong**

EMW Publishing

Cambridge, Massachusetts, USA



## CONTENTS

**SOLITON PARAMETER DYNAMICS IN A NON-KERR LAW MEDIA***A. Biswas, R. Kohl, M. E. Edwards, and E. Zerrad*

1	Introduction . . . . .	2
2	Mathematical Analysis . . . . .	3
3	Kerr Law . . . . .	9
4	Power Law . . . . .	12
5	Parabolic Law . . . . .	16
6	Dual-Power Law . . . . .	22
7	Conclusions . . . . .	31

**A NOVEL COMPACT AND WIDE-BAND UNI-PLANAR EBG STRUCTURE***B.-Q. Lin, J. Liang, Y.-S. Zeng, and H.-M. Zhang*

1	Introduction . . . . .	37
2	Design . . . . .	38
3	Experimental Results . . . . .	39
4	Conclusion . . . . .	42

**V-SHAPED MONOPOLE ANTENNA FOR BROADBAND APPLICATIONS***A. A. Dastranj, A. Imani, and H. R. Hassani*

1	Introduction . . . . .	45
2	Antenna Configuration . . . . .	46
3	Results of Simulation . . . . .	48
4	Parametric Studies and Discussion . . . . .	50
5	Conclusion . . . . .	52

**STUDY ON TWO COMPACT CPW-FED BANDPASS FILTERS USING DUAL-MODE PATCH RESONATOR***J. Wang, H. Zhang, L.-X. Ma, and H.-Y. Xu*

1	Introduction . . . . .	55
2	Description of the Filter . . . . .	56
3	Simulation and Experimental Results . . . . .	58

4	Conclusion . . . . .	60
---	----------------------	----

**LINEAR ANTENNA ARRAY DESIGN WITH USE OF  
GENETIC, MEMETIC AND TABU SEARCH  
OPTIMIZATION ALGORITHMS**

*Y. Cengiz and H. Tokat*

1	Introduction . . . . .	63
2	Formulation . . . . .	66
3	Design Examples . . . . .	67
4	Conclusions . . . . .	70

**A UNIQUENESS THEOREM FOR INITIAL-BOUNDARY  
VALUE PROBLEMS IN TELLEGEN MEDIUM**

*B. S. Altan*

1	Introduction . . . . .	73
2	Initial-boundary Value Problems in Tellegen Media . . . . .	76
3	Conservation of Energy for Tellegen Media . . . . .	78
4	A Unique Theorem for Initial-boundary Value Problems in Tellegen Medium . . . . .	80
5	Conclusions . . . . .	84

**STUDY ON AN UWB PLANAR TAPERED SLOT  
ANTENNA WITH GRATINGS**

*H.-Y. Xu, H. Zhang, and J. Wang*

1	Introduction . . . . .	87
2	Analysis and Description of the Antenna . . . . .	88
3	Simulation Results . . . . .	91
4	Conclusion . . . . .	92

**A CLOSED FORM ANALYTIC SOLUTION FOR  
COUPLED NONUNIFORM TRANSMISSION LINES**

*M. Khalaj-Amirhosseini*

1	Introduction . . . . .	95
2	The Equations of CNTLs . . . . .	96
3	Analytic Solution of CNTLs . . . . .	97
4	Examples and Results . . . . .	98
5	Conclusion . . . . .	102

**BROADBAND AND HIGH-GAIN E-SHAPED  
MICROSTRIP ANTENNAS FOR HIGH-SPEED  
WIRELESS NETWORKS**

*T. A. Denidni, N. Hassaine, and Q. Rao*

1	Introduction . . . . .	105
2	Antenna Design . . . . .	107
3	Results . . . . .	108
4	Conclusion . . . . .	110

**A MULTIMODE INTERFERENCE COUPLER WITH  
EXPONENTIALLY TAPERED WAVEGUIDE**

*J.-J. Wu*

1	Introduction . . . . .	113
2	Theory . . . . .	114
3	Numerical Simulation and Results . . . . .	117
4	Conclusion . . . . .	119

**HOMOMORPHIC ENHANCEMENT OF INFRARED  
IMAGES USING THE ADDITIVE WAVELET  
TRANSFORM**

*H. I. Ashiba, K. H. Awadallah, S. M. El-Halfawy  
and F. E. Abd El-Samie*

1	Introduction . . . . .	123
2	Additive Wavelet Transform . . . . .	124
3	Homomorphic Image Enhancement . . . . .	125
4	The Proposed Approach . . . . .	125
5	Experimental Results . . . . .	126
6	Conclusion . . . . .	129

**A NEW MATHEMATICAL PROPOSAL FOR  
GENERATION OF SHAPE INVARIANT POTENTIALS  
AND OPTICAL MEDIUM USING SUPERSYMMETRIC  
QUANTUM MECHANICS**

*H. Motavali and A. Rostami*

1	Introduction . . . . .	131
2	The Nikiforov-Uvarov Method . . . . .	133
3	Supersymmetric Quantum Mechanics . . . . .	134
4	The Model . . . . .	136
5	Conclusion . . . . .	139

**IMPROVED ADAPTIVE BACTERIA FORAGING  
ALGORITHM IN OPTIMIZATION OF ANTENNA  
ARRAY FOR FASTER CONVERGENCE**

*T. Datta, I. S. Misra, B. B. Mangaraj, and S. Imtiaj*

1	Introduction . . . . .	143
2	Brief Review of Bacteria Foraging Optimization Technique . .	145
3	Adaptive Bacteria Foraging Algorithm: Our Contribution . . .	147
4	Problem Statement . . . . .	148
5	Numerical Results . . . . .	149
6	Conclusion . . . . .	154

**MODIFIED ALGORITHM FOR REAL TIME SAR  
SIGNAL PROCESSING**

*Y. K. Chan, V. C. Koo, B. K. Chung, and H. T. Chuah*

1	Introduction . . . . .	159
2	Problem Statement . . . . .	161
3	Proposed Method and Computation Complexity . . . . .	162
4	SAR Processing Implementation . . . . .	163
5	Conclusion . . . . .	166

**FULL WAVE ANALYSIS OF TWO LAYERED  
ORTHOGONAL MICROSTRIP TRANSMISSION LINES  
BASED ON SPECTRAL DOMAIN METHOD**

*R. Rezaiesarlak, F. Hodjatkashani, and E. Mehrshahi*

1	Introduction . . . . .	169
2	The Method of Analysis . . . . .	170
3	Results and Discossion . . . . .	174
4	Conclusion . . . . .	175

**A NOVEL WIDEBAND BANDPASS FILTER BASED ON  
COMPLEMENTARY SPLIT-RING RESONATOR**

*X. Lai, Q. Li, P. Y. Qin, B. Wu, and C.-H. Liang*

1	Introduction . . . . .	177
2	The Resonant Property of CSRR . . . . .	178
3	Filter Design . . . . .	180
4	Conclusion . . . . .	183

**DESIGN OF COMPACT PLANAR INVERTED-L  
DIVERSITY ANTENNA FOR HANDHELD TERMINALS**

*H. L. Xiao and Z. P. Nie*

1	Introduction . . . . .	185
2	Handheld Terminals Antenna Design . . . . .	186
3	Conclusion . . . . .	188

**INPUT IMPEDANCE OF RECTANGULAR  
MICROSTRIP ANTENNAS ON NON-RADIATING  
EDGES FOR DIFFERENT FEED SIZES**

*D. Mandal, R. Kar, and A. K. Bhattacharjee*

1	Symbols . . . . .	191
2	Introduction . . . . .	192
3	Design . . . . .	192
4	Measurements . . . . .	192
5	Empirical Expressions for $f_{rect}$ . . . . .	193
6	Empirical Expressions for $R_{in}$ and $X_{in}$ . . . . .	194
7	Calculation of $R_{in}$ and $X_{in}$ . . . . .	196
8	Result . . . . .	196
9	Conclusions . . . . .	196

**FRACTIONAL SURFACE WAVEGUIDE**

*H. Maab and Q. A. Naqvi*

1	Introduction . . . . .	199
2	Fractional Surface Waveguide . . . . .	200
3	Conclusions . . . . .	207

**A NEW LINEAR SPACE-TIME BLOCK CODE FOR  
WIRELESS CHANNELS WITH CORRELATED FADING  
COEFFICIENTS**

*K. S. Nobandegani and P. Azmi*

1	Introduction . . . . .	211
2	The MIMO Channel Model . . . . .	213
3	The New Linear Space-Time Block Code . . . . .	214
4	Properties of the New Space-Time Code . . . . .	215
5	ML Decoding of the Proposed Linear Space-Time Block Code . . . . .	219
6	Error Performance Simulations . . . . .	220
7	Conclusions . . . . .	226

**DYNAMICAL PROBLEM OF A ROTATIONAL CHARGED DIELECTRIC RIGID BODY IN A UNIFORM MAGNETIC FIELD**

*G.-Q. Zhou, X. Xiao, and W.-J. Zhou*

1	Introduction.....	229
2	Fundamental Concepts of Charge Moment Tensor for a Rotational Charged Body .....	230
3	Dynamic Equation of Rotational Charged Dielectric Rigid Body in a Uniform Magnetic Field .....	232
4	The Lagrangian of Rotational Charged Dielectric Rigid Body in an Uniform Magnetic Field .....	233
5	Simple Conclusion about a Symmetric Case .....	236
6	An Example of Strict Solution .....	237
7	Concluding Remarks .....	238

**COMPARATIVE STUDY OF THE RESONANT FREQUENCY OF *E*-PLANE AND *H*-PLANE COUPLED MICROSTRIP PATCH ANTENNAS**

*M. Khan, I. Ray, D. Mandal, and A. K. Bhattacharjee*

1	Symbols .....	241
2	Introduction.....	242
3	Design and Experiments .....	242
4	Experimental Results.....	244
5	Conclusions .....	248