

---

**ELECTROMAGNETIC  
WAVES                      PIERM 04**

---

**Progress**

**In**

**Electromagnetics**

**Research M**

© 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 1937-8726

---

**ELECTROMAGNETIC  
WAVES                      PIERM 04**

---

**Progress**

**In**

**Electromagnetics**

**Research M**

**Chief Editor: Weng Cho Chew**

EMW Publishing

Cambridge, Massachusetts, USA



CONTENTS

**A NEW ULTRA-WIDEBAND BEAMFORMING FOR WIRELESS COMMUNICATIONS IN UNDERGROUND MINES**

*M. Nedil, T. A. Denidni, A. Djaiz, and A. M. Habib*

1	Introduction . . . . .	1
2	Design Procedure . . . . .	3
3	Conclusion . . . . .	17

**VARIATIONAL APPROACH METHOD FOR NONLINEAR OSCILLATIONS OF THE MOTION OF A RIGID ROD ROCKING BACK AND CUBIC-QUINTIC DUFFING OSCILLATORS**

*S. S. Ganji, D. D. Ganji, H. Babazadeh, and S. Karimpour*

1	Introduction . . . . .	23
2	Description of He’s variational Method . . . . .	24
3	The Motion of a Rigid Rod Rocking Back . . . . .	25
4	Cubic-Quintic Duffing Equations . . . . .	26
5	Discussion . . . . .	26
6	Conclusion . . . . .	29

**A RECURRENCE TECHNIQUE FOR COMPUTING THE EFFECTIVE INDEXES OF THE GUIDED MODES OF COUPLED SINGLE-MODE WAVEGUIDES**

*T. A. Ramadan*

1	Introduction . . . . .	33
2	Recurrence Dispersion Relation . . . . .	34
3	Modified Dispersion Function . . . . .	36
4	Diversity of Dispersion Functions . . . . .	39
5	Computations of the Roots of the Dispersion Equation . . . . .	40
6	Conclusion . . . . .	42
	Appendix A. Derivation of the Modified Dispersion Function, $\chi_M$	42
	Appendix B. Matrix Formulation of the Modified Dispersion Function . . . . .	43

### AN OPEN RESONANCE CELL FOR MILLIMETER WAVE DIELECTROMETER APPLICATIONS

*V. S. Miroshnichenko, P. N. Melezhik, and Y. B. Senkevich*

1	Introduction . . . . .	47
2	The 2-D ORC Model and Its Mode Features in H-polarisation . . . . .	48
3	Experimental Prototype of the ORC with a Dielectric Insert . . . . .	55
4	ORC Operation Features in E-polarized Excitation . . . . .	61
5	Conclusion . . . . .	63

### SMART ANTENNA BASED DS-CDMA SYSTEM DESIGN FOR THIRD GENERATION MOBILE COMMUNICATION

*A. Kundu, S. Ghosh, B. K. Sarkar, and A. Chakrabarty*

1	Introduction . . . . .	68
2	Smart Array Configuration . . . . .	70
3	The Algorithms for Smart Antenna Test Bed . . . . .	70
4	MVDR for Multiple Plane Wave Interferers . . . . .	74
5	MVDR for Multiple Plane-wave Signals . . . . .	76
6	Conclusion . . . . .	78

### A NOVEL DESIGN APPROACH FOR DUAL-BAND ELECTROMAGNETIC BAND-GAP STRUCTURE

*L.-J. Zhang, C.-H. Liang, L. Liang, and L. Chen*

1	Introduction . . . . .	81
2	Unit Model and Equivalent Circuit . . . . .	83
3	Proposed Structure . . . . .	86
4	Conclusion . . . . .	88

### PARAMETRIC STUDY OF WAVEGUIDE SLOTS AND ANALYSIS OF RADIATION PATTERN FOR THE DESIGN OF WAVEGUIDE ARRAY ANTENNA

*M. Mondal and A. Chakrabarty*

1	Introduction . . . . .	93
2	Synthesis of a Linear Array Antenna . . . . .	94
3	Determination of Slot Parameter . . . . .	97
4	Design of a Linear Array Antenna . . . . .	98
5	Conclusion . . . . .	101

**A NEW APPROACH TO EVALUATE THE SURFACE WAVES TERM FOR THE NONSYMMETRICAL COMPONENTS OF GREEN'S FUNCTIONS IN MULTILAYERED MEDIA**

*A. K. Abdelmageed*

1	Introduction . . . . .	105
2	Formulation . . . . .	107
3	Numerical Results . . . . .	112
4	Conclusion . . . . .	115

**DESIGN OF A TUNABLE OPTICAL FILTER BY USING A ONE-DIMENSIONAL TERNARY PHOTONIC BAND GAP MATERIAL**

*S. K. Awasthi and S. P. Ojha*

1	Introduction . . . . .	117
2	Theoretical Analysis [48, 49] . . . . .	119
3	Result and Discussion . . . . .	125
4	Conclusion . . . . .	128

**DESIGN AND APPLICATION OF A NOVEL CB-CPW STRUCTURE**

*J. Wang, H. Zhang, W.-H. Chen, and C. Sheng*

1	Introduction . . . . .	133
2	Design of a Novel CB-CPW . . . . .	134
3	Application of a Novel CB-CPW . . . . .	136
4	Conclusion . . . . .	141

**HE'S ENERGY BALANCE METHOD TO EVALUATE THE EFFECT OF AMPLITUDE ON THE NATURAL FREQUENCY IN NONLINEAR VIBRATION SYSTEMS**

*H. Babazadeh, D. D. Ganji, and M. Akbarzade*

1	Introduction . . . . .	143
2	Basic Idea . . . . .	144
3	Applications . . . . .	145
4	Conclusions . . . . .	151

### DESIGN AND OPTIMIZATION OF NONUNIFORMLY SPACED LONGITUDINAL SLOT ARRAYS

*H. Oraizi and M. T. Noghani*

1	Introduction . . . . .	155
2	Theory . . . . .	156
3	Design Procedure . . . . .	159
4	Results . . . . .	163
5	Conclusions . . . . .	163

### SPEECH ENHANCEMENT USING AN ADAPTIVE WIENER FILTERING APPROACH

*M. A. Abd El-Fattah, M. I. Dessouky, S. M. Diab  
and F. E. Abd El-samie*

1	Introduction . . . . .	167
2	Spectral Subtraction . . . . .	168
3	Wiener Filter in Frequency Domain . . . . .	170
4	The Proposed Adaptive Wiener Filter . . . . .	170
5	Experimental Results . . . . .	173
6	Conclusion . . . . .	183

### NONUNIFORMLY SPACED LINEAR ARRAY DESIGN FOR THE SPECIFIED BEAMWIDTH/SIDELobe LEVEL OR SPECIFIED DIRECTIVITY/SIDELobe LEVEL WITH COUPLING CONSIDERATIONS

*H. Oraizi and M. Fallahpour*

1	Introduction . . . . .	185
2	Basic Relations for Nonuniformly Spaced Linear Array Design	188
3	NUSLA Design for Specified Beamwidth and Minimum Sidelobe Level (Pencil Beam) . . . . .	190
4	NUSLA Design for Specified Directivity and Sidelobe Level..	194
5	Nonuniformly Spaced Parallel Dipole Array Design . . . . .	199
6	Conclusion . . . . .	206