
**ELECTROMAGNETIC
WAVES PIERB 25**

Progress

In

Electromagnetics

Research B

© 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 1937-6472

**ELECTROMAGNETIC
WAVES PIERB 25**

Progress

In

**Electromagnetics
Research B**

Chief Editor: Weng Cho Chew

EMW Publishing
Cambridge, Massachusetts, USA

CONTENTS

FACTORIZATION METHOD FOR FINITE FINE STRUCTURES*S. Sautbekov*

1	Introduction	1
2	Statement of Problem. Reducing of Problem to System of Integral Equation	3
3	The Solution of the Boundary Value Problem with the Wiener-Hopf Method	4
4	Resonance	14
5	Conclusion	16
	Appendix A. Etalon Integral, Special Function Υ	17

FA-SCANSAR: FULL APERTURE SCANNING PULSE BY PULSE FOR THE NEARSPACE SLOW-MOVING PLATFORM BORNE SAR*B. Sun, J. Chen, C.-S. Li, and Y.-Q. Zhou*

1	Introduction	23
2	FA-ScanSAR Principle	25
3	System Parameters Design for FA-ScanSAR	29
4	Performance Analysis	31
5	Design Example	34
6	Conclusion	36

CALCULATION OF THE NONLINEAR ABSORPTION COEFFICIENT OF A STRONG ELECTROMAGNETIC WAVE BY CONFINED ELECTRONS IN DOPING SUPERLATTICES*N. Q. Bau and D. M. Hung*

1	Introduction	40
2	Nonlinear Absorption Coefficient in the Case Absence of an External Magnetic Field	40
3	Nonlinear Absorption Coefficient in the Case of the Presence of an External Magnetic Field	45
4	Numerical Results and Discussions	47
5	Conclusion	50

**MINIATURE AND HIGHER-ORDER MODE FERRITE
MIMO RING PATCH ANTENNA FOR MOBILE COM-
MUNICATION SYSTEM**

*S. Bae, Y.-K. Hong, J.-J. Lee, J.-H. Park, J. Jalli, G. Abo
H.-M. Kwon and C. K. K. Jayasooriya*

1	Introduction	53
2	Experimental	54
3	Results and Discussion	57
4	Conclusion	71

**WEATHER RADAR NETWORK WITH PULSE COMP-
RESSION OF ARBITRARY NONLINEAR WAVEFORMS:
KA-BAND TEST-BED AND INITIAL OBSERVATIONS**

H. Lee and Y.-H. Kim

1	Introduction	75
2	Weather Radar Network	77
3	Arbitrary Waveform Generation for Pulse Compression	79
4	KA-band Radar System Design	81
5	Design of Tranceiver	83
6	Design of Processing	84
7	Initial Observations	87
8	Conclusion	89

**DATA-ADAPTIVE RESOLUTION METHOD FOR THE
PARAMETRIC THREE-DIMENSIONAL INVERSION
OF TRIAXIAL BOREHOLE ELECTROMAGNETIC
MEASUREMENTS**

F. O. Alpak and C. Torres-Verdín

1	Introduction	93
2	Data-adaptive Resolution Inversion (DRI) Method	95
3	Forward Model	99
4	Numerical Example	100
5	Discussion	105
6	Conclusion	106
	Appendix A. Data-adaptive Parameterization	107

PERFORMANCE EVALUATION OF PHASE-ANGLE GRADIENT METHOD FOR PHASE RETRIEVAL BASED ON LOW-FREQUENCY AMPLITUDE-ONLY NEAR-FIELD DATA

M. Johansson, H.-S. Lui, and M. Persson

1	Introduction	113
2	The Phase Angle Gradient Method	116
3	Numerical Test Cases	119
4	Discussion	128
5	Conclusion	129

THE LEVEL SET SHAPE RECONSTRUCTION ALGORITHM APPLIED TO 2D PEC TARGETS HIDDEN BEHIND A WALL

M. R. Hajishemi and M. El-Shenawee

1	Introduction	131
2	Methodology	134
3	Numerical Results	142
4	Conclusions	151

HOW LIGHTNING TORTUOSITY AFFECTS THE ELECTROMAGNETIC FIELDS BY AUGMENTING THEIR EFFECTIVE DISTANCE

S. L. Meredith, S. K. Earles, I. N. Kostanic, N. E. Turner and C. E. Otero

1	Introduction	156
2	Literary Background	157
3	Effective Distance	158
4	Simulation of Results	163
5	Conclusion	167

***E*-FIELD EXTRACTION FROM *H*-NEAR-FIELD IN TIME-DOMAIN BY USING PWS METHOD**

B. Ravelo

1	Introduction	172
2	Methodology of the Proposed Time-domain <i>E</i> -field Calculation Technique	173
3	Description of the Considered Transient Radiation Source	177
4	Validation Results	179

5 Conclusion 186

SHAPE SLOPE PARAMETER DISTRIBUTION MODELING OF ELECTROMAGNETIC SCATTERING BY RAIN DROPS

L. S. Kumar, Y. H. Lee, and J. T. Ong

1 Introduction 192
 2 DATA Selection and Measurement 195
 3 Results and Discussions 196
 4 Conclusion 206

RAIN ATTENUATION MODELING IN THE 10–100 GHz FREQUENCY USING DROP SIZE DISTRIBUTIONS FOR DIFFERENT CLIMATIC ZONES IN TROPICAL INDIA

S. Das, A. Maitra, and A. K. Shukla

1 Introduction 211
 2 Data Collection 212
 3 Analysis 214
 4 Results 216
 5 Conclusion 222

NOVEL, DUAL-BAND, SINGLE AND DOUBLE NEGATIVE METAMATERIALS: NONCONCENTRIC DELTA LOOP RESONATORS

C. Sabah

1 Introduction 225
 2 Design and Simulation 226
 3 Equivalent Circuit Model 228
 4 Results and Observations for the Individual DLRs:
 Single Band Case 230
 5 Results and Observations for the Individual DLRs:
 Dual-band Case 232
 6 Conclusion and Discussion 236

MULTI-FLOOR INDOOR POSITIONING SYSTEM USING BAYESIAN GRAPHICAL MODELS

A. S. Al-Ahmadi, A. I. Omer, M. R. Kamarudin, and T. A. Rahman

1 Introduction 241
 2 RSS Properties in Indoor Environments 243

3	Bayesian Graphical Models	248
4	Model and Measurement Setup	250
5	Conclusion	257

**DESIGN, FABRICATION AND CHARACTERIZATION
OF A DIELECTRIC RESONATOR ANTENNA REFLE-
CTARRAY IN KA-BAND**

*M. H. Jamaluddin, R. Sauleau, X. Castel, R. Benzerger, L. Le Coq
R. Gillard and T. Koleck*

1	Introduction	262
2	DRA Unit-cell	263
3	DRA Reflectarray: Design and Monolithic Fabrication	265
4	Experimental Results and Discussions	269
5	Conclusion	273

**PLANAR MONOPOLE UWB ANTENNA WITH UNII1/
UNII2 WLAN-BAND NOTCHED CHARACTERISTICS**

L. Lizzi, G. Oliveri, P. Rocca, and A. Massa

1	Introduction	277
2	Band Notched Antenna Design	279
3	Numerical and Experimental Assessment	281
4	Conclusions	289

**IMPROVED ANALYTICAL MODEL FOR SURFACE-
MOUNTED PM MOTORS CONSIDERING SLOTTING
EFFECTS AND ARMATURE REACTION**

T. Lubin, S. Mezani, and A. Rezzoug

1	Introduction	293
2	Problem Description and Assumptions	294
3	Analytical Model	295
4	Back-EMF and Torque Calculation	302
5	Verification of the Analytical Results Using FEM	304
6	Conclusion	310
	Appendix A.	310

**SYNTHESIS OF OPTIMAL NARROW BEAM LOW
SIDELOBE LINEAR ARRAY WITH CONSTRAINED
LENGTH**

J. J. Fuchs and B. Fuchs

1	Introduction	315
2	Problem Description	317
3	Optimal Equally Spaced Linear Array	320
4	Optimal Linear Array	322
5	Summary and Conclusion	329

**COMPARATIVE PERFORMANCE OF GRAVITATIONAL
SEARCH ALGORITHM AND MODIFIED PARTICLE
SWARM OPTIMIZATION ALGORITHM FOR SYN-
THESIS OF THINNED SCANNED CONCENTRIC RING
ARRAY ANTENNA**

A. Chatterjee, G. K. Mahanti, and N. Pathak

1	Introduction	332
2	Synthesis of Scanned Thinned Array	333
3	Gravitational Search Algorithm (GSA)	335
4	Modified Particle Swarm Optimization Algorithm	338
5	Simulation Results	339
6	Conclusions	347

**RADIOPHYSICAL AND DIELECTRIC PROPERTIES OF
ORE MINERALS IN 12–145 GHz FREQUENCY RANGE**

*V. V. Tikhonov, D. A. Boyarskii, O. N. Polyakova, A. L. Dzardanov
and G. N. Gol'tsman*

1	Introduction	349
2	Measurement Technique	350
3	Calculation of the Dielectric Properties	355
4	Discussion of the Results	359
5	Conclusion	366