
**ELECTROMAGNETIC
WAVES** **PIERB 41**

Progress

In

Electromagnetics

Research B

© 2012 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 41**

Progress

In

**Electromagnetics
Research B**

Chief Editor: Weng Cho Chew

EMW Publishing
Cambridge, Massachusetts, USA

CONTENTS

DETERMINATION OF CLOSED-FORM EXPRESSIONS FOR RAYLEIGH SCATTERING OF POLARIZED LIGHT FROM ADSORBED PARTICLES ON OR BELOW A SUBSTRATE*R. A. Simpkin*

1	Introduction	1
2	Theory	3
3	Comparison with Measured Data	14
4	Conclusions	20
	Appendix A. A Note on Fresnel Reflection Coefficients and Sign Conventions Used for the Complex Ellipticity Ratio	21

BEHAVIORAL MODEL OF SYMMETRICAL MULTI-LEVEL T-TREE INTERCONNECTS*B. Ravelo*

1	Introduction	24
2	Global Modeling of Lumped Tree Distribution	27
3	T-tree Modeling with Lumped RLC-network	32
4	Applications with Lumped RLC and Microstrip T-tree Interconnects	36
5	Conclusion	44

A CIRCUIT MODEL FOR VERTICAL MULTILAYER TRANSITIONS IN COPLANAR WAVEGUIDE TECHNOLOGY*B. Lopez-Berrocal, E. Marquez-Segura, I. Molina-Fernandez and J. C. Gonzalez-Delgado*

1	Introduction	51
2	Transition Geometry and Proposed Circuit Model	54
3	Model Discussion and Limitations	58
4	Model Assessment	59
5	Experimental Results	67
6	Conclusions	70
	Appendix A. Tables of Physical and Electrical Parameters	71

PERFORMANCE ANALYSIS OF PARALLEL NON-ORTHOGONAL PEEC-BASED SOLVER FOR EMC APPLICATIONS

D. Daroui and J. Ekman

1	Introduction	77
2	Non-Orthogonal PEEC Formulation	79
3	Parallelization of the PEEC-based Solver	84
4	Validation of Non-orthogonal Formulation	87
5	Numerical Test (i) — Triangular Plates	89
6	Numerical Test (ii) — Sphere	94
7	Conclusions and Further Work	96

UNCERTAINTY ESTIMATION IN COMPLEX PERMITTIVITY MEASUREMENTS BY SHIELDED DIELECTRIC RESONATOR TECHNIQUE USING THE MONTE CARLO METHOD

E. Páez, M. A. Azpúrua, C. Tremola, and R. C. Callarotti

1	Introduction	101
2	Complex Permittivity Measurements by Shielded Dielectric Resonator Technique	103
3	Uncertainty Estimation Using Monte Carlo Method	105
4	The Measurement Process	108
5	Results	112
6	Conclusions	116

MUTUAL COUPLING ANALYSIS USING FDTD FOR DIELECTRIC RESONATOR ANTENNA REFLECTAR-RAY RADIATION PREDICTION

N. I. Dzulkipli, M. H. Jamaluddin, R. Gillard, R. Sauleau, R. Ngah M. R. Kamarudin, N. Seman, and M. K. A. Rahim

1	Introduction	121
2	Unit-cell	122
3	DRA Reflectarray	131
4	Conclusions	134

A NOVEL GREEN ANTENNA PHASE-SHIFT SYSTEM WITH DATA ACQUISITION BOARDS

*M. F. Jamlos, T. A. Rahman, M. R. Kamarudin, M. A. Jamlos
M. A. Romli, Z. A. Ahmad, M. F. Malek, M. Jusoh, and N. F. Kahar*

1	Introduction	138
2	Spatial Reconfigurable RLSA Antenna Structure	140
3	Intelligent Phase Shifter Using National Instruments Data Acquisition Module (Ni-Daq) with LabVIEW Software	143
4	Results and Discussion	145
5	Conclusion	150

HUMAN HEAD INTERACTION OVER GROUND PLANE BOOSTER ANTENNA TECHNOLOGY: FUNCTIONAL AND BIOLOGICAL ANALYSIS

A. Andújar, J. Anguera, C. Picher, and C. Puente

1	Introduction	154
2	Description of the Radiating Systems	156
3	Functional Analysis	158
4	Biological Compatibility	174
5	Evaluation Criteria	177
6	Conclusion	181

ANALYSIS OF COUPLED MICROSTRIP LINES FOR QUAD-BAND EQUAL POWER DIVIDERS/COMBINERS

A. M. El-Tager, A. M. El-Akhdar, and H. M. El-Hennawy

1	Introduction	187
2	Study of Dual Band Transformer Using Coupled Microstrip Lines	190
3	Design of Proposed Quad-band Power Divider	198
4	Proposed Quad-band Power Divider for 3G and 4G Applications	201
5	Comparison to Other Conventional Techniques	204
6	Conclusion	206
	Appendix A.	207
	Appendix B.	207

A MULTI-DIMENSIONAL ADAPTIVE SAMPLING METHOD FOR ANALYSIS AND DESIGN OF FREQUENCY SELECTIVE SURFACE WITH ARBITRARY ELEMENT

X. Ma, G.-B. Wan, and W. Wan

1	Introduction	214
2	Model and Mom Anlaysis of FSS	215
3	Theory of Adaptive Sampling Method	217
4	Numerical Results	220
5	Conclusions	227

RIGOROUS SUBSTANTIATION OF THE METHOD OF EXACT ABSORBING CONDITIONS IN TIME-DOMAIN ANALYSIS OF OPEN ELECTRODYNAMIC STRUCTURES

O. Shafalyuk, P. Smith, and L. Velychko

1	Introduction	231
2	Formulation of the Model Initial Boundary Value Problem . .	233
3	Exact Absorbing Condition for an Artificial Boundary and the Transport Operator	235
4	Equivalence Theorem	240
5	Numerical Example	244
6	Conclusion	247

PERFORMANCE ANALYSIS OF STAP ALGORITHMS BASED ON FAST SPARSE RECOVERY TECHNIQUES

Z. C. Yang, Z. Liu, X. Li, and L. Nie

1	Introduction	251
2	Signal Model	253
3	Principle of SR-STAP Type Algorithms	254
4	Fast SR Techniques	255
5	Performance Assessment	259
6	Conclusion and Discussion	266

ALL-DIELECTRIC FREQUENCY SELECTIVE SURFACES WITH FEW NUMBER OF PERIODS

J. H. Barton, R. C. Rumpf, R. W. Smith, C. Kozikowski and P. Zellner

1	Introduction	269
2	Guided-mode Resonance Filters	270

3	Baseline Design	273
4	Effect of Finite Length	275
5	Approach	276
6	Experimental Results	278
7	Conclusion	281

ISAR IMAGING OF NON-UNIFORM ROTATION TARGETS WITH LIMITED PULSES VIA COMPRESSED SENSING

J. H. Liu, X. Li, S. K. Xu, and Z. W. Zhuang

1	Introduction	285
2	Radar Echo Model of Non-uniform Rotation Targets and Sparsity Analysis	287
3	Compressive Data Acquisition and Measurement Matrix Evaluation	291
4	Radar Image Formation	293
5	Simulation Experiments	296
6	Conclusions	302

HIGHER-ORDER STATISTICS FOR STOCHASTIC ELECTROMAGNETIC INTERACTIONS: APPLICATIONS TO A THIN-WIRE FRAME

O. O. Sy, M. C. van Beurden, B. L. Michielsens

J. A. H. M. Vaessen and A. G. Tijhuis

1	Introduction	307
2	Stochastic Model	310
3	Higher-order Chebychev Confidence Intervals	313
4	Maximum-entropy Principle	315
5	Voltage Induced at the Port of a Thin-wire Setup	318
6	Conclusion	329

MARGINAL MOMENT GENERATING FUNCTION BASED ANALYSIS OF CHANNEL CAPACITY OVER CORRELATED NAKAGAMI-m FADING WITH MAXIMAL-RATIO COMBINING DIVERSITY

V. K. Dwivedi and G. Singh

1	Introduction	333
2	Channel Model	335
3	Marginal Moment Generating Function Evaluation	336

4	Marginal MGF Based Channel Capacity Analysis	337
5	Results and Discussion	348
6	Conclusions	353

EFFICIENT ADAPTIVE DETECTION THRESHOLD OPTIMIZATION FOR TRACKING MANEUVERING TARGETS IN CLUTTER

J. T. Wang, H. Q. Wang, Y. L. Qin, and Z. W. Zhuang

1	Introduction	357
2	Problem Formulation	359
3	Adaptive Detection Threshold Optimization	362
4	Simulation Results	367
5	Conclusion	372

INDUCTANCE AND FORCE CALCULATION FOR AXISYMMETRIC COIL SYSTEMS INCLUDING AN IRON CORE OF FINITE LENGTH

T. Lubin, K. Berger, and A. Rezzoug

1	Introduction	377
2	Problem Formulation and Assumptions	379
3	Analytical Solution of the Magnetic Field	380
4	Interface Conditions between the Regions	384
5	Self-inductance and Electromagnetic Force Expression	386
6	Analytical Results and Comparison with Finite Element Simulations	388
7	Conclusion	393

GYROTROPIC-NIHILITY IN FERRITE-SEMICONDUCTOR COMPOSITE IN FARADAY GEOMETRY

V. R. Tuz, O. D. Batrakov, and Y. Zheng

1	Introduction	397
2	Problem Statement	400
3	Effective Medium Theory	402
4	Reflected and Transmitted Fields. Polarization transformation	408
5	Conclusion	414

**HIGH FREQUENCY ELECTROMAGNETIC FIELD
MODELING AND EXPERIMENTAL VALIDATION OF
THE MICROWAVE DRYING OF WHEAT SEEDS**

*V. D. Soproni, S. M. Vicas, T. Leuca, M. N. Arion, F. I. Hathazi
and C. O. Molnar*

1	Introduction	419
2	Fields Problem Formula	420
3	Numerical Simulation	422
4	Results and Discussions	426
5	Conclusions	436