Progress
In
Electromagnetics
Research C
ELECTROMAGNETIC WAVES PIERC 29

Progress
In
Electromagnetics
Research C

Chief Editor: Weng Cho Chew

EMW Publishing
Cambridge, Massachusetts, USA
## CONTENTS

**OPTIMUM DESIGN OF MODIFIED SCHIFFMAN MULTI-SECTION WIDE BAND DIFFERENTIAL PHASE SHIFTER WITH IMPEDANCE MATCHING**  
*H. Oraizi and A. Shamsafar*  
1 Introduction .............................................. 1  
2 Numerical Procedure ................................. 2  
3 Single Section Phase Shifter ....................... 3  
4 Design Example 1 ..................................... 4  
5 Double Two-section Phase Shifter .................. 6  
6 Design Example 2 ..................................... 7  
7 Double Four-section Phase Shifter ................ 8  
8 Design Example 3 ..................................... 11  
9 Conclusion .............................................. 15

**RECTANGULAR STEPPED PATCH ANTENNA AT GSM 900 FOR ENERGY SCAVENGING**  
*N. M. Din, C. K. Chakrabarty, K. K. A. Devi, and S. Sadasivam*  
1 Introduction ............................................. 17  
2 Antenna and PI Matching Network Design ............ 19  
3 Methodology ........................................... 22  
4 Results and Discussion ............................... 22  
5 Conclusions ............................................ 26

**MINIATURIZED SUBSTRATE INTEGRATED WAVEGUIDE DUAL-MODE FILTERS LOADED BY A SERIES OF CROSS-SLOT STRUCTURES**  
*L.-N. Chen, Y.-C. Jiao, Z. Zhang, and F.-S. Zhang*  
1 Introduction ............................................. 29  
2 Design of Miniaturized SIW Dual-mode Filters ........ 30  
3 Experimental Results and Discussion ................ 37  
4 Conclusion ............................................. 38
PASSIVE COMPENSATION OF BEAM SHIFT IN A BENDING ARRAY
T. J. Seidel, W. S. T. Rowe, and K. Ghorbani
1 Introduction .................................................. 41
2 Behavior of a Bending Array ............................. 42
3 Passive Compensation ....................................... 44
4 Conclusion .................................................... 51

A NOVEL BEAM SCANNING/DIRECTIVITY RECONFIGURABLE M-EBG ANTENNA ARRAY
M. Hajj, M. Salah Toubet, Y. Abdallah, R. Chantalat, and B. Jecko
1 Introduction .................................................. 55
2 Beam Scanning M-EBG Antenna Design .................. 57
3 Reconfigurable M-EBG Antenna Design .................. 63
4 Conclusion .................................................... 65

A RECONFIGURABLE STACKED PATCH ANTENNA FOR WIRELESS POWER TRANSFER AND DATA TELEMETRY IN SENSORS
1 Introduction .................................................. 67
2 Antenna Design ............................................... 69
3 Results ......................................................... 70
4 Application of Reconfigurable Antenna for Wireless Power Transmission ......................... 76
5 Conclusion .................................................... 79

GEOMETRICAL CORRECTION FOR CELL DEPLOYMENT IN STRATOSPHERIC CELLULAR SYSTEMS
S. Aljahdali, M. Nofal, and Y. Albagory
1 Introduction .................................................. 83
2 Flat-earth Coverage Model ................................. 85
3 Real-earth Coverage Model ................................. 86
4 Comparison .................................................... 88
5 SPs Radio Coverage Design ................................. 89
6 Terrestrial Cellular Structure ............................ 91
7 SPs Cellular System Design ................................. 92
8 Conclusion .................................................... 95
CONICAL LINEAR SPIRAL ANTENNA FOR TRACKING, TELEMETRY AND COMMAND OF LOW EARTH ORBIT SATELLITES

K. F. A. Hussein

1 Introduction ........................................... 97
2 Antenna Geometry and Modeling ......................... 98
3 Analysis and Design .................................. 100
4 Numerical Results and Discussion ..................... 102
5 Antenna Construction and Feeding ..................... 103
6 Antenna Measurements ................................ 104
7 Conclusion ........................................... 106

AN IMPROVED $L_1$-SVD ALGORITHM BASED ON NOISE SUBSPACE FOR DOA ESTIMATION

F. L. Liu, L. Peng, M. Wei, P. P. Chen, and S. M. Guo

1 Introduction ........................................... 109
2 Background .......................................... 111
3 The proposed Method .................................. 113
4 Simulation ............................................ 115
5 Conclusion ........................................... 119

PLANAR MONOPOLE ANTENNA WITH TWO COUPLED STRIPS FOR INTERNAL EIGHT-BAND LTE/WWAN LAPTOP COMPUTER APPLICATION

H.-W. Liu, C.-M. Chiang, and C.-F. Yang

1 Introduction ........................................... 123
2 Antenna Design ....................................... 125
3 Simulated and Experimental Results .................... 129
4 Conclusion ........................................... 132

A COMPACT UWB ANTENNA WITH SHARP DUAL BAND-NOTCHED CHARACTERISTICS FOR LOWER AND UPPER WLAN BAND

G. Yang, Q.-X. Chu, and T.-G. Huang

1 Introduction ........................................... 135
2 UWB Antenna Design for Single Band-notched ........... 137
3 UWB Antenna Design for Dual Band-notched ............ 144
4 Conclusion ........................................... 146
ANTENNA CHARACTERIZATION AND DETERMINATION OF PATH LOSS EXPONENTS FOR 677 MHz CHANNEL USING FIXED AND PORTABLE DIGITAL TERRESTRIAL TELEVISION
F. S. Caluyo and J. C. Dela Cruz

1 Introduction ................................................................. 150
2 Measurement Procedure ................................................. 152
3 Measurement Results .................................................... 154
4 Conclusion and Recommendation ................................. 159

A COMPACT LINEAR TAPERED SLOT ANTENNA WITH INTEGRATED BALUN FOR UWB APPLICATIONS

1 Introduction ................................................................. 163
2 Configuration of the Proposed Antenna ............................. 165
3 Experimental Results and Discussions ......................... 168
4 Time-domain Response .................................................. 170
5 Conclusion ................................................................. 174

THE RESEARCH AND APPLICATION OF COMBINING LUT AND MEMORY COMPENSATION FOR TWTA LINEARIZATION WITH RELATIVELY LOW SAMPLING FREQUENCY
X. Hu, G. Wang, Q.-L. Li, Z.-C. Wang, and J.-R. Luo

1 Introduction ................................................................. 177
2 Effect of the Memory Polynomial Predistortion Linearizer on the TWTA Linearity Performance ..................... 178
3 A Proposed DPD for the TWTA ....................................... 181
4 Implementation and Measurement Results ....................... 185
5 Conclusion ................................................................. 188

3D FREQUENCY SELECTIVE SURFACES
S. N. Azemi, K. Ghorbani, and W. S. T. Rowe

1 Introduction ................................................................. 191
2 Circular Ring FSS ....................................................... 193
3 3D Cylindrical FSS ..................................................... 194
4 Dielectric Filling of the Cylindrical Unit Elements ............. 197
5 Conclusion ................................................................. 201
A NEW ACCURATE VOLterra-based MODEL FOR BEHAVIORAL MODELING AND DIGITAL PREDISTOR- TION OF RF POWER AMPLIFIERS
T. Du, C. Yu, Y. Liu, J. Gao, S. Li, and Y. Wu
1 Introduction .................................................. 205
2 Volterra-based Behavioral Models .......................... 207
3 Discription of the New Volterra-based Model .......... 208
4 The Experimental Results and Discussion ............... 211
5 Conclusion ..................................................... 216

DECoupled UNitary ESPRit ALGORITHM FOR 2-D DOA ESTIMATION
J. Jiang and L. Gan
1 Introduction .................................................. 219
2 Centro-Hermitian Matrix .................................. 221
3 Decoupled Unitary ESPRIT Algorithm ................. 222
4 Computer Simulation Results ............................. 229
5 Conclusions ................................................... 233

NOVEL COMPOSITE RIGHT/LEFT-HANDED LEAKY- WAVE ANTENNAS BASED ON THE FOLDED SUBSTRATE-INTEGRATED-WAVEGUIDE STRUCTURES
T. Yang, P.-L. Chi, and R. Xu
1 Introduction .................................................. 236
2 The Proposed Antenna Unit Cell Based on the FSIW ..... 237
3 Simulation and Experimental Results ................... 240
4 Conclusion ..................................................... 246

NOVEL CLASS OF MICROSTRIP BANDPASS FILTERS WITH IMPROVED UPPER REJECTION BAND
Y.-L. Lu and G.-L. Dai
1 Introduction .................................................. 249
2 Coupling Properties between the Half-wavelength Resonator and the Feed Line ...................... 250
3 Filter Design ................................................ 253
4 Conclusion ..................................................... 258
TWO DIMENSIONAL MULTI-PORT METHOD FOR ANALYSIS OF PROPAGATION CHARACTERISTICS OF SUBSTRATE INTEGRATED WAVEGUIDE

E. Abaei, E. Mehrshahi, G. Amendola, E. Arnieri, and A. Shamsafar

<table>
<thead>
<tr>
<th></th>
<th>Introduction</th>
<th>261</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Structure and Method Of Analysis</td>
<td>263</td>
</tr>
<tr>
<td>3</td>
<td>Propagation Characteristics of SIW Modes</td>
<td>266</td>
</tr>
<tr>
<td>4</td>
<td>EBG and Mode Conversion in Periodic SIW</td>
<td>268</td>
</tr>
<tr>
<td>5</td>
<td>Numerical Results</td>
<td>269</td>
</tr>
<tr>
<td>6</td>
<td>Conclusion</td>
<td>272</td>
</tr>
</tbody>
</table>