

# **Antenna Applications Symposium 2011**

**Monticello, Illinois, USA  
20-22 September 2011**

**ISBN: 978-1-61839-195-7**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2011) by the Antenna Symposium  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the Antenna Symposium  
at the address below.

Antenna Symposium  
Daniel Schaubert  
149 Aubinwood Road  
Amherst, MA 01002

Phone: (413) 545-2530  
Fax: (413) 253-5181

[shaubert@ecs.umass.edu](mailto:shaubert@ecs.umass.edu)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## 2011 ANTENNA APPLICATIONS SYMPOSIUM

20 - 22 September 2011  
Monticello, Illinois

<b>Non-Foster Metamaterials</b> D.J. Gregoire, C.R. White and J.S. Colburn	<b>1</b>
<b>Thermoregulation and Compensation Using Substrate-Embedded Capillaries</b> S.A. Long, F.J. Drummond, S. Lee, E.F. Estes, R.B. Burgess and G.H. Huff	<b>16</b>
<b>Development of a Disc-Shaped UAV Based on the Archimedean Spiral Antenna</b> G.H. Huff, T-K Chen, K. Buchanan, J.D. Barrera, F. Drummond, A. Couch, N. Brennan, C. Kirkland and Q. Manley	<b>27</b>
<b>Low-Cost Wideband 18-40 GHz Antenna with Consistent and Wide Radiation Patterns</b> M.J. Radway and D.S. Filipovic	<b>44</b>
<b>Fluidically Tunable Phase Shifting Surfaces for High-Power Tunable Lens Applications</b> M. Li and N. Behdad	<b>56</b>
<b>Realization of Multiple Modes on a Patch Antenna Using Aperture Coupling</b> M.P. Daly and J.T. Bernhard	<b>66</b>
<b>Analysis, Design and Measurements of Dual-Polarized Sinuous Antennas</b> R. Sammeta and D. Filipovic	<b>86</b>
<b>Differential Near Field Holography for Small Antenna Arrays</b> B. Janice, J. Herd, S. Duffy and S. Makarov	<b>107</b>
<b>Miniaturized Slot Antennas for RFID Systems: Design Methodology and Measurements</b> J.E. Ruyle and J.T. Bernhard	<b>137</b>

<b>Ultra-Low Profile, Compact UWB Antennas Based on the Concept of Closely Coupled, Dual-Mode Radiators</b>	<b>153</b>
N. Behdad, M. Li and M.A. Al-Joumayly	
<b>Bandwidth Limitations, Matching and Fabrication of Multimode Electrically Small Antennas</b>	<b>162</b>
J.J. Adams, S.C. Slimmer, J.A. Lewis and J.T. Bernhard	
<b>Efficient Window Mount UHF Antennas</b>	<b>180</b>
R.B. Waterhouse, B. Essenberg, J. Manry and D. Novak	
<b>A Small “Spiral-Pole” Antenna – The Hybrid Structure Combining One Dipole Wing and a Single-Arm Spiral</b>	<b>205</b>
I. Khair, S. Sabah, D. Stevens and S.N. Makarov	
<b>Extremely Short Vertical Electric Dipole Antennas Using Magnetic Materials</b>	<b>224</b>
H.R. Stuart	
<b>Resolution Limitations in UHF Direction of Arrival Estimation Using Electrically Small Arrays</b>	<b>239</b>
M.J. Slater, C.D. Schmitz, D.L. Jones and J.T. Bernhard	
<b>Wideband Array-Based Monopulse Direction Finding Systems</b>	<b>255</b>
N. Jastram, N. Sutton and D. Filipovic	
<b>Initial Analysis of Faceted Phased Arrays</b>	<b>271</b>
D.M. McKay and J.E. Cartland	
<b>Linear Array Performance Limits Due to 3-D Element Position Errors</b>	<b>297</b>
A. Adrian and L. Kempel	
<b>Bandwidth Limits for Low Profile Planar Arrays</b>	<b>317</b>
J. Doane, K. Sertel and J. Volakis	
<b>An RF Architecture for Modular Active Aperture Electronically Steered Arrays</b>	<b>339</b>
J.H. Pozgay	
<b>A Non-Uniformly Spaced 1D AESA</b>	<b>358</b>
M.J. Buckley, L.M. Paulsen, J.D. Wolf, and J.B. West	

<b>Review of Scattering and Re-radiation by a Receiving Antenna</b>	<b>381</b>
S.J. Weiss and W.K. Kahn	
<b>Using GPUs to Accelerate Installed Antenna Performance Simulations</b>	<b>398</b>
T. Courtney, J.E. Stone and B. Kipp	
<b>Body Area Antenna Link Modeling Using MATLAB® Engine</b>	<b>412</b>
G. Noetscher, Y. Xu and S.N. Makorov	
<b>A Study of Cylindrical Surface Waveguide Propagation and of a Highly-Efficient Launching Method</b>	<b>446</b>
K. Erickson and J. Bernhard	

**Additional material not included in original printed Proceedings**

<b>Design of PUMA Arrays with 5:1 Bandwidths</b>	<b>460</b>
S.S. Holland and M.N. Vouvakis	
<b>Excitation and Termination of Finite Tightly Coupled Antenna Arrays Based on Structural Characteristic Modes</b>	<b>495</b>
I. Tzanidis, K. Sertel and J.L. Volakis	
<b>Artificial Impedance Surface Antennas</b>	<b>509</b>
D.J. Gregoire and J.S. Colburn	
<b>Measurement of Metamaterials in Parallel-Plate Waveguide Medium</b>	<b>522</b>
A.I. Zaghloul, Y. Lee T. Anthony and S.J. Weiss	