Efficient Shaped Beam Synthesis in Phased Arrays and Reflectors

Friday, June 1
5pm Social Hour • 6pm Presentation

Syracuse University
Sci-Tech 4-201

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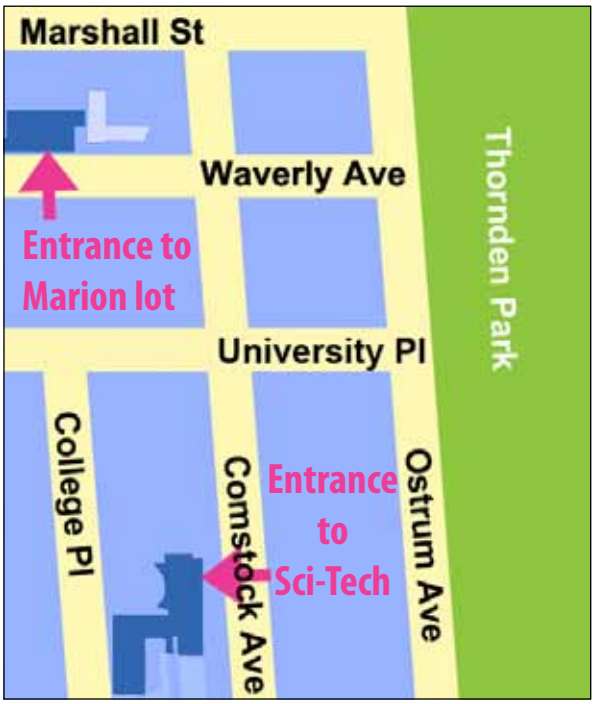

Shaped beam array synthesis invites considerable attentions because arrays offer in-orbit reconfigurability, which is an attractive feature for communication and broadcasting satellites. In this talk, we present a brief overview of commonly used beam shaping algorithms. This is followed by the Projection Matrix Method of synthesis. The Projection Matrix method relies on orthogonal projection of the desired far field intensity vector onto the space spanned by the far field intensity vectors of the array elements. It is found that for a uniform convergence of the solution the far field sample space must be extended beyond the coverage region, otherwise the projection matrix becomes ill-conditioned. A general guideline for the far field sample space is provided. The method, with necessary amendments, is then employed successfully for a reflector surface synthesis. The method is found to be several times faster than the gradient search method commonly used for beam synthesis. Numerical results for array and shaped reflector syntheses are shown and the advantages are discussed.

ABOUT THE AUTHOR

Arun K. Bhattacharyya received his B.Eng. degree in electronics and telecommunication engineering from Bengal Engineering College, University of Calcutta in 1980, and the M.Tech. and Ph.D. degrees from Indian Institute of Technology, Kharagpur, India, in 1982 and 1985, respectively.

After several years in academia, he joined Boeing Satellite Systems (formerly Hughes Space and Communications), Los Angeles as a senior staff engineer, in July 1991 and then promoted to scientist and senior scientist ranks in 1994 and 1998, respectively. Dr. Bhattacharyya became a Technical Fellow of Boeing in 2002. In September 2003 he joined Northrop Grumman Space Technology group as a staff scientist, senior grade. He became a Distinguished Engineer which is a very rare and honorable recognition in Northrop Grumman. He is the author of "Electromagnetic Fields in Multilayered Structures-Theory and Applications", Artech House, Norwood, MA, 1994 and "Phased Array Antennas, Floquet Analysis, Synthesis, BFNs and Active Array Systems", Hoboken, Wiley, 2006. He authored over 95 technical papers and has 15 issued patents.

Dr. Bhattacharyya became a Fellow of IEEE in 2002. He is a recipient of numerous awards including the 1996 Hughes Technical Excellence Award, 2002 Boeing Special Invention Award for his invention of High Efficiency horns, 2003 Boeing Satellite Systems Patent Awards and 2005 Tim Hannemann Annual Quality Award, Northrop Grumman Space Technology.

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For more information, please contact Michael Enders at mdenders@syr.edu.

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