Analysis method of microstrip antennas on hemispherical multilayer structures

Giang T.V.B., Dreher A.

College of Technology, Vietnam National University, Hanoi, Viet Nam; German Aerospace Center (DLR), Institute of Communications and Navigation, D-82234 Wessling, Germany

Abstract: A generalized method for the analysis of microstrip antennas, which are placed on or embedded in hemispherical multilayer structures, is presented. By using corresponding full-wave equivalent circuits, the dyadic Green's functions of these structures and their system equations for the tangential field components at the interfaces can be analytically derived in a simple way. The numerical results are verified with commercial software codes. Some effects of the curvature and the ground plane on the input impedance of microstrip antennas are shown. ?? 2008 IEEE.

Author Keywords: Conformal antennas; Hemispherical structures; Method of moments; Microstrip antennas; Numerical techniques; Spherical sector structures

Index Keywords: Antennas; Convergence of numerical methods; Differential equations; Equivalent circuits; Green's function; Microstrip antennas; Microwave antennas; Multilayers; Wave equations; Analysis methods; Commercial softwares; Conformal antennas; Dyadic green's functions; Field components; Generalized methods; Ground planes; Hemispherical structures; Input impedances; Multilayer structures; Numerical results; Numerical techniques; Spherical sector structures; System equations; Method of moments

Year: 2008

Source title: IEEE Transactions on Antennas and Propagation

Volume: 56

Issue: 10

Page : 3324-3327

Cited by: 1

Link: Scorpus Link

Correspondence Address: Giang, T.V.B.; College of Technology, Vietnam National University, Hanoi, Viet Nam; email: giangtvb@vnu.edu.vn

ISSN: 0018926X

CODEN: IETPA

DOI: 10.1109/TAP.2008.929544

Language of Original Document: English

Abbreviated Source Title: IEEE Transactions on Antennas and Propagation

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Giang, T.V.B., College of Technology, Vietnam National University, Hanoi, Viet Nam

2. Dreher, A., German Aerospace Center (DLR), Institute of Communications and Navigation, D-82234 Wessling, Germany

References:

1. A. J. M. Polegre, A. G. Roederer, G. A. E. Crone, and P. I. J. de Maagt, Applications of conformal array antennas in space missions, presented at the 2rd Eur. Conformal Antennas Workshop, The Hague, The Netherlands, Apr. 2001Allister, M.W., Long, S.A., Resonant hemispherical dielectric antenna (1984) Electron. Lett, 20, pp. 657-659. , Aug
2. Wong, K.L., Chen, N.C., Chen, H.T., Analysis of hemispherical dielectric resonator antenna with an airgap (1993) Microw. Guided Wave Lett, 3, pp. 355-357. , Oct
3. Kishk, A.A., Zhou, G., Glisson, A.W., Analysis of dielectric-resonator antennas with emphasis on hemispherical structures (1994) IEEE Antennas Propag. Mag, 36, pp. 20-31. , Apr
4. Poon, Y.W., Tam, W.Y., Resonance of a multilayer hemispherical dielectric resonator (1996) Proc. Int. Symp. on Antennas Propag. (ISAP'96), pp. 1009-1012. , Sep
5. Leung, K.W., Complex resonance and radiation of hemispherical dielectric -resonator antenna with concentric conductor (2001) IEEE Trans. Microw. Theory Tech, 49, pp. 524-531. , Mar
6. Leung, K.W., Ng, H.K., Theory and experiment of circular polarized dielectric resonator with a parasitic patch (2003) IEEE Trans. Antennas Propag, 51, pp. 405-412. , Mar
7. Larsen, N.V., Breinbjerg, O.K., Analysis of circularly polarized hemispheroidal dielectric resonator antenna phased arrays using the method of auxiliary sources (2007) IEEE Trans. Antennas Propag, 55, pp. 2163-2173. , Aug
8. Giang, T.V.B., Thiel, M., Dreher, A., Dyadic Green's function of multilayer spherical sector structures (2003) Proc. 3rd Eur. Conformal Antennas Workshop, pp. 65-68. , Bonn, Germany, Oct
9. Giang, T.V.B., Thiel, M., Dreher, A., A unified approach to the analysis of radial waveguides, dielectric resonators and microstrip antennas on spherical multilayer structures (2005) IEEE Trans. Microw. Theory Tech, 53 (1), pp. 404-409. , Jan
10. Giang, T.V.B., Thiel, M., Dreher, A., Unified solution for the analysis of spherical conformal multilayer structures and its application to microstrip antennas (2005) Proc. 4th Eur. Conformal Antennas Workshop, pp. 31-34. , Stockholm, Sweden, May
11. Balanis, C.A., (1989) Advanced Engineering Electromagnetics, , New York: Wiley
12. Tam, W.Y., Luk, K.M., Resonance in spherical circular microstrip structures (1991) IEEE Trans. Microw. Theory Tech, 39, pp. 700-704. , Apr
13. Sipus, Z., Burum, N., Bartolic, J., Analysis of rectangular microstrip patch antennas on spherical structures (2003) Microw. Opt. Technol. Lett, 36, pp. 276-280. , Feb