超寬頻梳型漸增式槽口天線於縮距量測場之應用

吳旻翰、張道治 ; 李金椿

E-mail: 9607882@mail.dyu.edu.tw

摘 要

天線量測系統大致上可分為室內近場與遠場量測系統、縮距反射面天線量測系統、室外遠場天線量測系統，一般在天線量測系統中的發射天線皆是由許多窄頻之天線所組成，當需量測寬頻之天線時，即便要使用到許多不同頻段之窄頻天線，對於量測結果將有許多不確定之因素。 在本篇論文當中，將針對縮距反射面天線量測系統分別設計兩種不同頻段之梳型漸增式槽口天線，亦可應用於各種類型之天線量測場，而在設計天線的特性時，也特別針對低頻的部份加以改良，此兩天線之工作頻寬分別為1GHz~10GHz和8GHz~26GHz。除了具有超寬頻之特性外，亦具有對稱之天線場型、低指向性及相位中心對頻率而言變動甚小等優異特性。而兩種不同頻段之天線，亦可完全涵蓋時域脈衝天線量測系統之工作頻段，即可大大改善時域脈衝天線量測系統之工作效能。 而利用梳型漸增式槽口天線作為一商用180公分的衛星直播天線之饋入源，並結合了時域脈衝天線量測系統，此系統可以截取並移除反射面天線之邊緣所產生之繞射場，設計出寬頻縮距反射面天線量測場。為了做寬頻縮距反射面天線量測場之靜態區的量測，使用寬頻梳型漸增式槽口天線來當作發射天線，並將此建構於縮距反射面天線之饋入端，利用自製的X-Y scanner分別在1, 4, 7 和 10GHz量測縮距天線量?場靜態區的場強大小分佈與相位分佈。為了做梳型漸增式槽口天線輻射場型的比較及驗證，將分別於多功能近場量測場與縮距天線量測場做輻射場形的量?。

關鍵詞 : 時域脈衝天線量測系統 ; 縮距反射面天線量測場 ; 梳型漸增式槽孔天線

目錄

參考文獻

[1] Microwave Engineering Online Europe Magazine, http://www.mwee.com/magazine/2000/cad_benchmark.html [2] Pranay R. Acharya, Hans Ekstrom, and Steven S. Gearhart, etal.,“ Tapered Slot Antennas at 802 GHz ”IEEE Trans. On Microwave Theory and Techniques, vol. 41, No. 10, October 1993.

[3] K. S. Yngvesson et al.,“ The Tapered Slot Antenna-A New Integrated Element for Millimeter-Wave Applications, ”IEEE Transactions on Microwave Theory and Techniques, vil. MTT-37,No. 2, pp. 365-374, Feb. 1989.

[4] Chen Wu, Linping Shen,Gang-Yi Deng,Ying Shen and John Litva,“ Experimental Study of a Wide Band LTSA Which is Fed by an Inverted Microstrip Line(IML), ”IEEE Antennas and Propagation Society International Symposium, vol. 4, pp. 2328-2331, 1998.

[5] E.Gazit,“ Improved Design of the Vivaldi Antenna, ”IEEE Proceeding, Part H vol. 135, No2, pp. 89-92, 1988.

[6] Satoru Sugawara,“ Characteristics of a mm-wave tapered slot antenna with corrugated edges ”IEEE MTT-S Digest, pp. 533-436, 1998.

[7] E.S. Gillespie, D.W. Hess, and C.F. Stubenrauch,“ Antenna measurements: a comparison of far-field, compact range and near-field techniques, ”Proceeding of 1994 Conference in Precision Electromagnetic Measurements, pp.375, June 1994.

[8] M.S.A. Sanda and L. Shafal, ”Dual parabolic cylindrical reflectors employed as a compact range, ”IEEE Trans. on Antenna and

Propagation, Vol. 38, No. 8, pp.812~814, August 1996.
[9] D.C. Chang, C.C. Yang, and S.Y. Yang, “ Dual-reflector system with a spherical main reflector and shaped subreflector for compact range, ” IEE Proceedings - Microwave, Antennas, and Propagation, Vol. 144, No. 2, pp.97~102, April 1997.
[10] J.P. McKay and Y. Rahmat-Samii, “ Quiet zone evaluation of serrated compact range reflectors, ” Proceedings of 1990 IEEE International Symposium on APS/URSI, Vol. 4, pp. 232~235, May 1990.
[11] I.J. Gupta, K.P. Erickson, and W.D. Burnside, ” A method to design blended rolled edges for compact range reflectors, ” IEEE Trans. on Antenna and Propagation, pp.853~861, January 1990.
[12] M.S.A. Mahmoud, T.H Lee, and W.D. Burnside, ” Enhanced compact range reflector concept using an R-card fence: two-dimensional case, ” IEEE Trans. on Antenna and Propagation, pp.419~428, March 2001.
[13] R. V. De Jongh, M. Hajian, and L. P. Ligthart, “ Antenna time domain measurement techniques, ” IEEE Trans. on Antenna and Propagation, pp.7~11, October 1997.
[14] 蔡宗穎，高效率多波束反射面及各種天線量?場饋源天線之開發，碩士論文，大葉大學電信所，2006年6月 [15] George E. Ponchak, Jennifer L. Jordan, and Christine T. Chevalier, “ Characteristics of Double Exponentially Tapered Slot Antenna (DETSA) Conformed in the Longitudinal Direction Around a Cylinder, ” IEEE Trans. on Antenna and Propagation, LETTERS, Vol. 6, 2007.
[16] 莊肇堂，V 頻段與W 頻段微波光子通信系統中積體漸進式開槽天線之研製，碩士論文，中央大學電機工程研究所，2006年6月 [17] Symeon Nikolaou,George E. Ponchak,John Papapolymerou and Manos M. Tentzeris, “ Conformal Double Exponentially Tapered Slot Antenna (DETSA) on LCP for UWB Applications, ” IEEE Trans. on Antenna and Propagation,Vol.54, NO.6, June 2006.
[18] Sang-Gyu Kim and K.Chang “ Ultra wideband exponentially-tapered antipodal Vivaldi antennas ” IEEE Antennas and Propagation Society Symposium, Volume: 3, pp. 2273 – 2276, June 2004, Monterey, CA.
[19] Yo-Shen Lin, Tzyh-Ghuang Ma, Shyh-Kang Jeng and Chun Hsiung Chen, “ Coplanar waveguide-fed dual exponentially tapered slot antennas for ultra-wideband applications ” , Antennas and Propagation Society Symposium, Volume:3 , pp. 2951 – 2954, June 2004, Monterey, CA.
[20] Marc C. Greenberg, Kathleen L. Virga and Cynthia L. Hammond, “ Performance Characteristics of the Dual Exponentially Tapered Slot Antenna (DETSA) for Wireless Communications Applications ” IEEE Trans. On Vehicular Technology,Vol.52,No.2,March 2003.
[21] S. Nikolaou, L. Marcaccioli, G. E. Ponchak, J. Papapolymerou, and M. M. Tentzeris, “ Conformal double exponentially slot antennas (DETSA) for UWB communications systems ’ front-ends, ” in 2005 IEEE Int. Conf. Ultra-Wideband (ICU 2005) Dig., Zurich, Switzerland, Sep. 5 – 8, 2005.
[22] K. S. Yngvesson, T. L. Korzeniowski, Y. S. Kim, E. L. Kollberg and J. F. Johansson, “ The Tapered Slot Antenna – A New Integrated Element for MM Wave Applications, ” IEEE Trans. Microwave Theory and Tech., Vol. 37, No. 2, pp. 365-374, Feb. 1989.
[23] M.C. Greenberg, L.L. Virga, “ Characterization and design methodology for the dual exponentially tapered slot antenna ” IEEE Antennas and Propagation Society International Symposium, Volume: 1 , pp:88 - 91, July 1999, Atlanta, GA.
[24] Tzyh-Ghuang Ma and Shyh-Kang Jeng “ A compact tapered-slot-feed annular slot antenna for ultra-wideband applications ” , IEEE Antennas and Propagation Society Symposium, Volume: 3, pp. 2943 – 2946, June 2004, Monterey, CA.