

The Optimum Design of Reflector Antennas and Their Applications

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ABSTRACT

In this paper the theory analysis of the paraboloid reflector antenna and feed source as well as the characteristics of the reflector antenna is used to develop a multibeam shape reflector antenna and computer code. The computer code can analyze antenna patterns, gain, efficiency, beamwidth, and scan angle. Measurement results of the shaping reflector antenna will verify the computer code. The feed source, which is used in the study of the characteristics of the corrugated horn antenna, includes studying differences of depth, aperture shape and aperture angle. For each of these a comparison of simulated and measurement results is done. The corrugate horn antenna will be applied for the VSAT (Very Small Aperture Terminal). Finally, the paraboloid reflector antenna is used for two different applications: the first one uses a 35 cm offset reflector. The feed source is a corner reflector dipole antenna. The frequency range is from 4.5 GHz to 5 GHz, and this design can be used for site survey. The feed source of the first application differs from that of the traditional horn antenna and offers some advantages such as reduced manufacturing costs and a simple manufacturing process. The second application of the paraboloid reflector is a commercially available 160cm DBS (Direct Broadcast Satellite) to design a compact antenna test range without edge treatment and RF anechoic chamber. The DBS antenna is the reflector antenna of CATR (Compact Antenna Test Range), and also is without edge treatment. The combination of the reflector antenna and the ITDAMS (Impulse Time Domain Antenna Measurement System) is used as the CATR, the edge diffraction fields are gated out by the ITDAMS. Three kinds of antenna are chosen to verify the possibility of the new CATR. The results of these verifications are also compared with the near field range, far field range, and proposed CATR results. The verified results are almost similar. The size of the quiet zone is about 55 cm in width, 55 cm in height, and 55 cm in depth. The operating frequency range is up to 26GHz. Key Words: Open waveguide, ITDAMS, Multibeam reflector antenna

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Table of Contents

封面內頁 簽名頁 授權書	iii	中文摘要	
.	iv	英文摘要	vi
.	viii	目錄	ix
.	xi	圖目錄	
.	xv	表目錄	xvi
第一章 緒論 1.1 反射面天線之簡介	1	1.2 反射面天線之設計原理	
.	2	1.3 孔徑場與遠場之轉換	4
.	4	1.4 本論之架構	6
第二章 多波束形變反射面天線之設計 2.1 多波束反射面天線之簡介	12	2.2 多波束形變反射面天線之最佳化設計	13
.	13	2.3 多波束反射面天線之模擬分析及量測結果比較	16
第三章 波紋喇叭天線之設計 3.1 波紋喇叭天線之簡介	33	3.2 不同結構的波紋喇叭天線之設計	33
.	33	3.3 波紋喇叭天線之模擬與量測結果比較	36
第四章 小型衛星地面站收發雙向衛星天線設計 4.1 小型衛星地面站收發雙向衛星天線之簡介	45	4.2 小型衛星地面站收發雙向衛星天線之設計	46
.	45	4.3 小型衛星地面站收發雙向衛星天線之模擬分析與量測結果	47
第五章 應用在地點探測之反射面天線設計 5.1 偶極天線及九十度角反射器之簡介	57	5.2 偶極天線及九十度角反射器之理論分析	57
.	57	5.3 偶極天線及九十度角反射器之模擬分析與量測結果	59
第六章 不需要微波暗室及邊緣處理之縮距天線量測場之設計 6.1 縮距天線量測場之簡介	66	6.2 不需要微波暗室及邊緣處理之縮距天線量測場之理論分析	67
.	66	6.3 不需要微波暗室及邊緣處理之縮距天線量測場之驗證	68
第七章 結論	84	參攷文獻	87
附錄 已發表之研討會論文、期刊及專利	90	圖目錄 圖1.1 中心聚焦反射面天線	8
.	90	圖1.2 偏焦反射面天線	8
.	8	圖1.3 拋物面反射面天線幾何結構	9
.	8	圖1.4 拋物面反射面天線之孔徑場與遠場之轉換圖	9
.	9	圖1.5 孔徑場的幾何分析圖形	10
.	9	圖1.6 孔徑場與遠場場形轉換之示意圖	10
.	10	圖1.7 橢圓形之孔徑場與遠場之轉換	11
.	10	圖2.1 傳統低軌道同步衛星直播系統	18
.	18	圖2.2 多波束低軌道同步衛星直播系統	18

圖2.3 多個饋入源的拋物面反射面天線(形變前)	19	圖2.4 形變前之大小分佈	19
圖2.5 形變前的相位變化	20	圖2.6 形變前的反射面天線之位置變動量	20
圖2.7 形變前之反射面天線場型	21	圖2.8 形變後的多個饋入源拋物面反射面天線	21
圖2.9 形變後之大小分佈	22	圖2.10 拋物面反射面天線之線性相位變化	22
圖2.11 拋物面反射面天線修改之相位變化	23	圖2.12 形變後的相位變化	23
圖2.13 形變後的反射面天線之變動量	24	圖2.14 形變後的反射面天線場型	24
圖2.15 二次修正之拋物面反射面天線線性相位變化	25	圖2.16 二次修正之拋物面反射面天線修改之相位變化	25
圖2.17 多波束形變反射面天線之設計流程圖	26	圖2.18 大小尺寸為52乘46公分之多波束反射面天線	27
圖2.19 分析之多波束反射面天線場型	27	圖2.20 實際量測之多波束反射面天線場型	28
圖2.21 大小尺寸為85乘62公分之多波束反射面天線	28	圖2.22 分析之多波束反射面天線場型	29
圖2.23 實際量測之多波束反射面天線場型	29	圖2.24 分析軟體的操作流程圖	30
圖3.1 波紋喇叭天線的幾何圖形	37	圖3.2 縱深長度為七圈與十圈的波紋喇叭天線	37
圖3.3 模擬七圈與十圈波紋喇叭天線之反射損失	38	圖3.4 七圈與十圈的波紋喇叭天線模擬之E-plane場型	38
圖3.5 孔徑形狀為圓形與橢圓形的波紋喇叭天線	39	圖3.6 模擬圓形與橢圓形波紋喇叭天線之反射損失	39
圖3.7 模擬圓形與橢圓形波紋喇叭天線之E-plane場型	40	圖3.8 模擬圓形與橢圓形波紋喇叭天線之H-plane場型	40
圖3.9 張角角度為45度、60度及90度的波紋喇叭天線	41	圖3.10 模擬開口張角為45度、60度及90度的反射損失	41
圖3.11 模擬45度、60度及90度張角的E-plane場型	42	圖3.12 張角60度之波紋喇叭天線在近場之量測情形	42
圖3.13 張角60度之波紋喇叭天線的模擬與量測之E-plane場型	43	圖3.14 張角90度之波紋喇叭天線在近場之量測情形	43
圖3.15 張角90度之波紋喇叭天線的模擬與量測之E-plane場型	44	圖4.1 正交模式收發器	49
圖4.2 波紋喇叭天線加上OMT之實體圖	49	圖4.3 波紋喇叭天線之反射損失模擬圖	50
圖4.4 波紋喇叭天線加上OMT的反射損失量測圖	50	圖4.5 波紋喇叭天線在近場量測天線場型圖	51
圖4.6 波紋喇叭天線發射端的模擬與量測的E-plane場型	51	圖4.7 波紋喇叭天線發射端的模擬與量測的H-plane場型	52
圖4.8 波紋喇叭天線接收端的模擬與量測的E-plane場型	52	圖4.9 波紋喇叭天線接收端的模擬與量測的H-plane場型	53
圖4.10 VSAT天線在近場量測場型圖	53	圖4.11 VSAT在發射端量測的E-plane及H-plane場型	54
圖4.12 VSAT在接收端量測的E-plane及H-plane場型	54	圖4.13 VSAT在室外遠場量測場型	55
圖4.14 VSAT在發射端量測的Azimuth場型	55	圖4.15 VSAT在發射端量測的Azimuth場型	56
圖5.1 量測偶極天線之反射損失	61	圖5.2 偶極天線大小尺寸之幾何圖形	61
圖5.3 九十度角反射器之影像原理	62	圖5.4 偶極天線加上九十度角反射器尺寸	62
圖5.5 反射損失的模擬與量測的結果比較	63	圖5.6 偶極天線加上角反射器E-plane場型之模擬與量測比較	63
圖5.7 偶極天線加上角反射器H-plane場型之模擬與量測比較	64	圖5.8 使用縮距天線量測系統來量測新研發之反射面天線	64
圖5.9 新研發反射面天線之H-plane場型	65	圖6.1 X-Y平面掃描器來調校縮距反射面量測場	72
圖6.2 水平切面的相位, 脈衝時域量測系統(實線), 頻域量測系統(點狀線)	72	圖6.3 垂直切面的相位, 脈衝時域量測系統(實線), 頻域量測系統(點狀線)	73
圖6.4 水平切面的大小, 脈衝時域量測系統(實線), 頻域量測系統(點狀線)	73	圖6.5 垂直切面的大小, 脈衝時域量測系統(實線), 頻域量測系統(點狀線)	74
圖6.6 水平切面, 同極化(實線), 交叉極化(點狀線)	74	圖6.7 垂直切面, 同極化(實線), 交叉極化(點狀線)	75
圖6.8 水平切面不同深度的電場強度之大小分佈	75	圖6.9 垂直切面不同深度的電場強度之大小分佈	76
圖6.10 水平切面不同深度的電場強度之相位分佈	76	圖6.11 垂直切面不同深度的電場強度之相位分佈	77
圖6.12 寬頻喇叭天線在近場量測場型	77	圖6.13 新技術量測寬頻喇叭天線場型	78
圖6.14 傳統遠場距離量測寬頻喇叭天線場型	78	圖6.15 量測寬頻喇叭天線E-plane場型和不同測試場之比較	79
圖6.16 量測寬頻喇叭天線H-plane場型和不同測試場之比較	79	圖6.17 DBS(60cm)在近場量測場型	80
圖6.18 新技術量測DBS(60cm)場型	80	圖6.19 室外遠場量測DBS(60cm)場型	81
圖6.20 量測DBS天線H-plane場型和不同之量測場之比較	81	圖6.21 Cassegrain天線(25cm)在近場量測場型	82
圖6.22 新技術量測Ka頻段Cassegrain LMDS天線場型	82	圖6.23 量測Cassegrain天線E-plane場型和不同量測場之比較	83
圖6.24 量測Cassegrain天線H-plane場型和不同量測場之比較	83	表目錄 表2.1 形變前之反射面天線增益	31
表2.2 形變後之反射面天線增益	31	表2.3 多波束天線之分析及實際量測之比較	31
表2.4 多波束天線之分析及實際量測之比較	32	表4.1 VSAT設計規格與實際量測歸納	56

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