

论文

卫星角反射器有效衍射区域的研究

周辉¹,李松¹,郑国兴¹,高俊玲¹,韩春俊²

(1 武汉大学 电子信息学院|武汉 430079)

(2 国营红峰机械厂|湖北 孝感 432000)

摘要:

本文基于角反射器的几何结构模型,采用矢量形式的折反射定律,推导了在不同入射条件下有效衍射区域的数学表达式.通过数值模拟的方法分析了有效衍射区域的变化规律,以及该规律对远场衍射光强空间分布的影响.结果表明,随着光束入射角的增加,有效衍射区域逐渐减小,进而导致角反射器衍射强度发散程度增加.光束方位角的引入不会改变有效衍射区域的形状和衍射强度的总能量,而只会使其各自分布旋转方位角的大小.在不考虑大气效应的情况下,根据不同入射条件对应的衍射强度分布,并结合速差补偿理论,提出了一种全新的角反射器口径设计方法.

关键词: 角反射器 有效衍射区域 远场衍射光强 速差补偿

Effective Diffraction Region for Satellite Retroreflector

ZHOU Hui¹,LI Song¹,ZHENG Guo-xing¹,GAO Jun-ling¹,HAN chun-jun²

(1 School of Elect ronic Inf ormation,Wuhan University,Wuhan 430079,China)

(2 Hong Feng Machinal Factory,Xiaogan,Hubei 432000,China)

Abstract:

Based on geometrical structure of retroreflector and vector form of reflection-refraction law, a mathematical model with EDR is built up for retroreflector.By the means of numerical simulation, the regularity of change for EDR and the impaction of regularity on far field diffraction intensity (FFDI) are analysed. The simulated results show that EDR decreases with the increase of the divergence of FFDI with laser incidence angle.But,laser amuzith has no impact on shape of EDR and total diffraction intensity,which only makes their distributions rotate amuzith angle. When atmospheric effects are ignored,In terms of FFDI distribution with different incidence condition and velocity aberration theory, the new way for designing retroreflector radius is put forward.The investigation of EDR provides important approach to calculate FFDI and design satellite retroreflector.

Keywords: Retroreflector Effective diffraction region Far field diffraction intensity Velocity aberration compensation

收稿日期 2008-06-10 修回日期 2008-09-02 网络版发布日期 2009-08-25

DOI:

基金项目:

航天工程项目

通讯作者: 周辉

作者简介:

参考文献:

[1] ZHANG Wen-xi, XIANG Li-bin,YUAN Yan,et al. Ultra-rapid-scanning imaging interferometer [J] .

Acta Photonica Sinica, 2006, 35(8): 1153-1155.

张文喜,相里斌,袁艳,等. 高速转镜干涉成像光谱仪 [J] .光子学报, 2006, 35(8): 1153-1155.

[2] WAN Qiang, GUO Yan-long, WANG Xiao-bing, et al. Present status and progress of laser cooperative targets for SLR [J] .Laser and Optoelectronics Progress, 2005,42(5):20-29.

万强,郭延龙,王小兵,等. 卫星激光测距合作目标现状与进展 [J] ,激光与光电子学进展. 2005,42(5):20~29.

扩展功能

本文信息

Supporting info

PDF(1739KB)

HTML

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

角反射器

有效衍射区域

远场衍射光强

速差补偿

本文作者相关文章

周辉

[3] GAO Wei. Study on evaluation of jamming effectiveness on laser radars [J]. Acta Photonica Sinica, 2007, 36(8): 1400-1404.

高卫. 激光雷达干扰效果评估方法研究 [J]. 光子学报, 2007, 36(8): 1400-1404.

[4] CAI Yan-min, FANG Zu-jie, CHEN Gan, et al. Effective reflection area of a cube-corner retroreflector [J]. Chinese Journal of Lasers, 2000, B9(5): 429-433.

[5] WANG Yuan-ming, YANG Fu-min, CHEN Wan-zhen, et al. Calculation and measurement of the effective reflective area of space-born retro-reflectors [J]. Opto-Electronic Engineering, 2007, 34(10): 25-29.

王元明, 杨福民, 陈婉珍, 等. 卫星激光反射器有效反射面积的计算与测试 [J]. 光电工程, 2007, 34(10): 25-29.

[6] ZHOU Kun, LI Ji-tao, CHEN Zhen-pei. Applied optics [M]. Chengdu: Press of Sichuan University, 1995: 4-5.

周焜, 李继陶, 陈祯培. 应用光学 [M]. 成都: 四川大学出版社, 1995: 4-5.

[7] LIANG Quan-ting. Physical optics [M]. Beijing: Machine Industry Press, 1986: 165-166.

梁铨廷. 物理光学 [M]. 北京: 机械工业出版社, 1986: 165-166.

[8] NEUBERT R. Preliminary design of the laser retroreflector for the CHAMP satellite [C]. Proc 10th Workshop on Laser Ranging Instrumentation, Shanghai, Nov. 1996, 216-222.

[9] ZHANG Jin-ye, LI Song, ZHOU Hui, et al. Testing errors for cube corner based on hartmann wavefront sensor [J]. Acta Photonica Sinica, 2007, 36(12): 2227-2230.

张金业, 李松, 周辉, 等. 基于哈特曼传感器的角锥棱镜误差测量 [J]. 光子学报, 2007, 36(12): 2227-2230.

[10] MINOTT P O. Design of retrodirector arrays for laser ranging of satellites [R]. NASA TM-X-723-74-122. Goddard Space Flight Center, March, 1974. 6-7.

[11] FAN Jian-xing. Design of satellite retroreflector and study of distribution effect [D]. Hangzhou: ZheJiang University, 2000. 57-65.

范建兴. 卫星激光反射器的设计和分布效应研究 [D]. 杭州: 浙江大学, 2000: 57-65.

本刊中的类似文章

文章评论 (请注意: 本站实行文责自负, 请不要发表与学术无关的内容! 评论内容不代表本站观点.)

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="8984"/>
反馈内容	<input type="text"/>		