光子学报 2011, 40(5) 794-797 DOI: 10.3788/gzxb20114005.0794 ISSN: 1004-4213 CN: 61-1235/O4



论文

# 线性对称耦合器的几何表示

时坚[1],马瑞琼[1],王翀[1],杨祎[1],段作梁[1],苗润才[2]

(1 西安邮电学院 电子工程学院,西安 710121)
(2 陕西师范大学 物理学与信息技术学院,西安 710062)

**摘要:**

利用线性对称耦合器两个波导中光场的电矢量构建了布洛赫矢量模型.通过布洛赫矢量的旋转变化使得光在两个波导通道中“跃迁”的过程非常直观.研究发现,随着线性对称耦合器的相位失配变得越严重,光能量在波导间的转换频率增快且转换效率降低,与传统的求解线性对称耦合器耦合波方程所得到的结果是一致的.

**关键词:** 光学开关 线性对称耦合器 耦合波方程 布洛赫矢量

## Geometrical Representation of the Linear Symmetric Coupler

SHI Jian[1],MA Rui-qiong[1],WANG Chong[1],YANG Yi[1],DUAN Zuo-liang[1],MIAO Run-cai[2]

（1 School of Electronic Engineering,Xi′an Institute of Posts and Telecommunications,Xi′an 710121,China）
（2 School of Physics and Information Technology,Shaanxi Normal University,Xi′an 710062,China）

Abstract:

A Bloch vector model was set up using the light field electric vector in two waveguides of the liner symmetric coupler.The light “transition” process in two waveguide channels was quite directly with the Bloch vector rotation changing.It was found that the more serious the propagation constant mismatches,the faster the frequency of light energy exchanges and the lower efficiency exchanges,which is equal to the results solved by the traditional equations.

Keywords: Optical switching Linear symmetric coupler Coupled-wave equation Bloch vector

**收稿日期** 2010-12-01 **修回日期** 2011-02-23 **网络版发布日期** 2011-05-25

DOI: 10.3788/gzxb20114005.0794

**基金项目**:

陕西省教育厅自然科学基金（No.09JK725）资助

**通讯作者**: 时坚

**作者简介**:

**参考文献:**

[1]ALMEIDA V R,BARRIOS C A,PANEPUCCI R R.All-optical control of light on a silicon chip [J].Nature,2004,431(10):1081-1084.
[2]LOCATELLI A,MODDOTTO D,PALOSCHI D,et al.All optical switching in ultrashort photonic crystal couplers[J].Optics Communications,2004,237(7):97-102.
[3]LI C F,DOU N.Optical switching in silicon nano-waveguide ring resonators based on Kerr effect and TPA effect[J].Chinese Physics Letters,2009,26(5):054203.
[4]LI C F,XU G M,MA L S,et al.An erbium-doped fibre nonlinear coupler with coupling ratios controlled by pump power[J].Journal of Optics A:Pure and Applied Optics,2005,7(10):540-543.
[5]BARAK A,LAMHOT Y,FRIEDLAND L,et al.Autoresonant dynamics of optical guided waves[J].Physical Review Letters,2009,103(12):123901.
[6]XIANG Y,WEN S,DAI X,et al.Modulation instability in nonlinear oppositely directed coupler with a negative-index metamaterial channel[J].Physical Review E,2010,82(5):056605.

扩展功能
本文信息
Supporting info
PDF(464KB)
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
光学开关
线性对称耦合器
耦合波方程
布洛赫矢量
本文作者相关文章
时坚
马瑞琼
杨祎
苗润才
王翀
段作梁

[7]VOROBEICHIK I,NAREVICIUS E,ROSENBLUM G,et al.Electromagnetic realization of orders-of-magnitude tunneling enhancement in a double well system[J].Physical Review Letters,2003,90(2):176806.
[8]LONGHI S.Coherent destruction of tunneling in waveguide directional couplers[J].Physical Review A,2005,71(6):065801.
[9]LONGHI S.Optical analog of population trapping in the continuum:Classical and quantum interference effects[J].Physical Review A,2009,79(2):023811.
[10]亚里夫A.现代通信光电子学[M].陈鹤鸣,施伟华,张力,译.5版.北京:电子工业出版社,2004:391-392.
[11]李福利.高等激光物理学[M].2版.北京:高等教育出版社,2006:37-46.

**本刊中的类似文章**

1. 朱京平; 李阳; 唐锐歆; 侯洵.多重散射理论声光耦合波方程的龙格-库塔法数值分析[J]. 光子学报, 2005,34(2): 284-287

**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 | | 邮箱地址 | |
| 反馈标题 | | 验证码 | 3563 |
| | | | |

Copyright 2008 by 光子学报