FIELD DISTRIBUTION OF Ti : $LiNbO_3$ SINGLE MODE OPTICAL WAVEGUIDE

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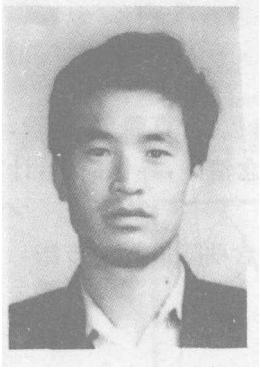
Abstract In this paper, we present a trial solution for the field distribution of Ti : $LiNbO_3$ single mode optical waveguide. The parameters for the solution can be determined by using point-by-point approximate method, we also analyse their physical meanings. In the meanwhile, we present the analytical expression of the propagation constant and the effective refrative index. Compared with the variational techique, the main advantage of this method is that the parameters are easy to be determined, the physical concepts are clear and the calculation quantities are small, providing a new and high accurate kind of calculation method for design of integrated optics.

Keywords Integrated optics; Optical waveguides; Single mode



He Xihong was born in Lanzhou, Gansu province, China on June 24, 1965, He graduated from Physics Department of North - West Normal University in 1987, then he worked in Yongdeng normal school of Gansu province for several years. From 1993 to now, he is studying for M. S degree in Tianjin University. His research interests include optical waveguides, integrated optics.

飞秒光纤激光器

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我们利用同步泵浦光纤喇曼环形激光器在1.396μm处得到195fs的光脉冲，并利用时间-色散调谐技术在1.396μm附近实现了47nm的波长调谐．我们采用1.313μm的Nd:YLF锁模脉冲泵浦，其喇曼光处于单模光纤的负色散区，利用孤子效应得到195fs的光脉冲．

实验中我们采用一台Nd:YLF(Quantronix Model 4216d)激光器作泵浦源，输出波长为1.313μm，主动锁模时输出脉宽约50ps．泵浦光经一枚双色镜反射后耦合进光纤．测试中使用的单模光纤是普通通讯用单模石英光纤．其零色散波长在1.305μm，芯径约为9.5μm．由于喇曼效应的作用，在光纤中产生1.395μm左右的喇曼光．喇曼光从光纤出来后经透镜准直、延迟后穿过双色镜反馈回光纤，其中一部分被反射作为输出．用PIN来监测泵浦脉冲与喇曼光脉冲的同步情况，并调节延迟线达到同步泵浦的要求．

我们所用单模光纤在零色散波长为λ_d=1.305μm，在反常色散区，自相位调制(SPM)和交叉相位调制(XPM)与光纤反常色散相互作用的结果形成孤子，孤子效应使喇曼光的脉冲宽度变窄．喇曼效应的增益带宽约有13THz，因而可以形成小于100fs的飞秒级光脉冲．实验中测量到最短的光脉冲是195fs，使用的光纤长度为300m．使用长的光纤可以降低泵浦阈值，但输出脉冲宽度增大了．

同步泵浦结构要求喇曼光在重新耦合进光纤时与下一个泵浦脉冲同步．当光纤激光器的腔长改变引起同步失败时，其输出波长会随之改变．由于色散的作用，波长改变引起的喇曼光在光纤中传输时间的变化正好补偿腔长的改变．通过调节腔长，我们得到了1.386～1.433μm的波长调谐．这种技术称为时间-色散调谐技术．