

光学元件与制造

电光有机聚合物多模干涉分束器

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摘要:

分束器是光纤通信系统中光无源网络和光子集成回路的重要器件。1×2 MMI(multimode interferences)电光有机聚合物分束器是利用自成像效应设计的。分析了1×2 MMI的工作原理。利用有效折射率方法(effective index method,EIM) 计算出1×2 MMI三维多模脊形波导的有效折射率分布。利用自成像效应的成像规律计算出成像位置并用导模传输分析法(guided mode propagation analysis,MPA)对输出波导的光强进行模拟。分析表明:在波长为1.55μm的情况下, 1×2 MMI的输出波导的光强在未加电极时可以实现预定分束比输出;加上电极之后,由于电光效应可调控有机聚合物波导折射率的改变,利用有限差分光束传播法模拟输出波导的分束比可在7.6dB范围内可调。

关键词: 电光有机聚合物 分束器 有效折射率法 导模传输分析法 分束比

AMultimode interference power splitter based on electro-optic organic/polymers

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Abstract:

〔WTBZ〕 Optical power splitters are essential devices for optical fiber communication system in passive optical networks(PONs) and photonic integrated circuits (PICs). As one of the optical splitters, 1×2 electro-optical multimode interference (EO-MMI) power splitter fabricated by electro-optic organic polymer was analyzed by the self imaging effect. The operation principle of the 1×2 EO-MMI power splitter was discussed. Firstly, the effective index of the three dimensional (3-D) ridge waveguide was computed by the effective index method (EIM). Then the positions of the two images were calculated respectively by using the formulas of the self image effect. The power-splitting ratio in the output waveguides was simulated by the guided mode propagation analysis (MPA). Research results show that, for the 1×2 EO-MMI power splitter operating at 1.55 microns, the special power splitter ratio can be obtained if there are no electrodes on the ridge waveguide. Furthermore, when the electrodes are put on the top of the waveguide, the power splitting ratio is realized for a tunable scope of 7.8dB, for the electro-optical effect to change the refractive index.

Keywords: electro-optic organic polymer power splitter effective index method guided mode propagation analysis power splitting ratio

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