

光学计量与测试

电光调制晶体半波电压倍频测量方法的讨论

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摘要:

在电光调制晶体的半波电压倍频法测量中,基于晶体电光效应分析了不同偏压下输出信号与调制信号之间的线性与倍频关系,并利用计算机模拟分析了调制信号的调制幅度对倍频信号的影响,分析结果表明倍频信号受高阶谐波分量的干扰产生波形畸变,不利于晶体半波电压的倍频法测量。提出利用李萨如图形的对称性来确定电光调制的倍频位置,克服了调制幅度波形畸变问题的干扰。通过对半波电压不同测量方法的实验测量和对比分析,说明该方法可操作性好,测量精确度也比直接观察倍频信号输出波形要高。

关键词: 电光调制 半波电压 倍频法

Frequency doubling method for half-wave voltage measurement based on electro-optical modulation

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Abstract:

To study half-wave voltage measurement in the electro-optic modulation experiment, the main relationships including double-frequency characteristics and linear characteristics between output signal and modulation signal are analyzed based on the principle of crystal electro-optic modulation. The influence of the amplitude of modulating signal on the frequency doubling signal is investigated by computer simulation. The analysis shows that the frequency doubling signal waveform is distorted under the impact of high order harmonic wave, which is not in favor of crystal half-wave voltage measurement. Symmetry of Lissajou figure is used to determine the position of the frequency doubling signal and overcome the disturbance of modulating amplitude waveform aberration. Compared to other methods, this method is easy to use and can measure half-wave voltage accurately.

Keywords: electro-optical modulation half-wave voltage frequency doubling method

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参考文献:

[1] 孙鉴, 牟海维, 刘世清, 等. 电光调制实验中半波电压的测量 [J]. 光电子技术, 2007, 27(3): 212-215.
SUN Jian, MOU Hai-wei, LIU Shi-qing, et al. Measurement of half-wave voltage in electro-optic modulation experiment [J]. Optoelectronic Technology, 2007, 27(3): 212-215. (in Chinese with an English abstract)

[2] 利潮锐. 晶体电光调制及通信观测分析 [J]. 实验室研究与探索, 2007, 26(12): 40-43.
LI Chao-ru, Observations of electro-optic effect and audio communication [J]. Research and exploration in laboratory, 2007, 26(12): 40-43. (in Chinese with an English abstract)

[3] 曹硕, 马莹莹, 高鹏. 锥光干涉图、光强透过率曲线对电光调制实验的影响 [J]. 辽宁大学学报, 2007, 34(4): 309-341.
CAO Shuo, MA Ying-ying, GAO Peng. The effect of conoscopic interference pattern and optic intensity transmissivity curve for electro-optic modulation experiment [J]. Journal of Liaoning University,

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2007, 34(4): 309-341.(in Chinese with an English abstract)

[4] 孙鉴, 牟海维, 刘世清, 等. 电光调制中半波电压测量方法的研究 [J]. 大学物理, 2008, 27(10): 40-43.

SUN Jian, MOU Hai-wei, LIU Shi-qing, et al. Study on measuring half-wave voltage in eletro-optic modulation [J]. College Physics, 2008, 27(10): 40-43. (in Chinese with an English abstract)

[5] 陈晓莉, 王培吉. 对晶体电光调制实验中输出光波曲线特性的理论分析 [J]. 实验技术与管理, 2008, 25(1): 52-54.

CHEN Xiao-li, WANG Pei-ji. Theoretic analysis on the export light-wave curve of electro-optical modulation experiment [J]. Experiment technology and Management, 2008, 25(1): 52-54. (in Chinese with an English abstract)

[6] 底楠, 徐晓鹏. 关于磁光调制倍频法的讨论和改进 [J]. 物理实验, 2007, 27(5): 10-12.

DI Nan, XU Xiao-peng. Discuss and improvement on momdf. [J]. Physics Experimentation, 2007, 27(5): 10-12. (in Chinese with an English abstract)

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2. 甘小勇; 刘永智; 张晓霞; 张长命. Mach-Zehnder电光波导调制器啁啾的研究[J]. 应用光学, 2004, 25(2): 11-14
3. 张长命, 刘永智, 戴基智, 甘小勇, 赵德双. 高速光学模数转换器的分析[J]. 应用光学, 2005, 26(3): 50-53
4. 郑国梁, 欧阳征标. 温度不敏感偏振无关电光调制器设计[J]. 应用光学, 2009, 30(6): 911-915

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