应用光学 2006 27 (4): 340-343 ISSN: 1002-2082 CN: 61-1171/O4

计量测试

用SPIDER法重构飞秒脉冲位相中参数的选择

文汝红, 刘天夫

中国计量学院信息工程学院，杭州310018

收稿日期 修回日期 网络版发布日期 2006-7-20 接受日期

摘要 为了更精确地测量飞秒脉冲特性以满足其不断拓宽的应用，基于光谱相位相干直接电场重构法（SPIDER）测量飞秒激光脉冲的基本原理和重构相位的反演算法，
数值模拟了SPIDER重构飞秒脉冲相位的过程，分析了时间延迟τ、
光谱剪切量Ω及滤波窗口宽度的选取原则。以宽度约为20fs的高斯型线性啁啾脉冲为例，
通过选取不同的时间延迟τ和光谱剪切量Ω重构脉冲的相位，发现重构位相曲线与原输入脉冲位相曲线最接近时，
时间延迟τ约为1210fs,相对光谱剪切量Ω/Δω约为9%，滤波窗口宽度约为τ/3。

关键词 光谱相位相干直接电场重构法 参数选取原则 飞秒脉冲

分类号

Optimization of parameters on reconstruction of phase of femtosecond laser pulse with SPIDER

WEN Ru-hong,LIU Tian-fu

College of Information Engineer, China Jiliang University, Hangzhou 310018, China

Abstract To meet the ever increasing applications of femtosecond laser pulse, it has to be measured more precisely. Based on the spectral phase interferometry of direct electric field reconstruction (SPIDER), the spectral phase of femotosecond laser pulse was reconstructed with numerical simulations. The crucial parameters that include the time delay τ between the tested pulse replicas, the frequency shear Ω and the width of filter window were analyzed to choose their values properly. With the Gauss linearly chirped pulse whose full width at half maximum (FWHM) is about 20fs, the phase is reconstructed with different time delay and different frequency shear Ω/Δω. The optimum phase curve is about at τ=1210fs and relative shear is Ω/Δω=0.09. The width of filtering window is about τ/3.

Key words SPIDER parameter selection principle femtosecond laser pulse

DOI:

通讯作者 文汝红 wenruhong12@yahoo.com.cn