

论文

高阶效应对自相似抛物线脉冲相互作用的影响*

刘伟慈,徐文成,冯杰,陈伟成

华南师范大学信息光电子科技学院光子信息技术(广东省高校)重点实验室

摘要:

讨论高阶效应对自相似抛物线脉冲传输中相互作用的影响.数值研究结果证明高阶效应使得自相似抛物线脉冲形状畸变非常严重,并加剧脉冲间的相互作用.我们分析了不同的高阶效应对脉冲间相互作用的具体影响.而且我们可通过幅度调制和脉冲压缩技术,获得较高质量的自相似抛物线脉冲串传输.这些结果对进一步研究高质量的自相似抛物线脉冲在高功率超短脉冲光纤放大器、激光器和传输系统中的应用有重要的意义.

关键词: 自相似抛物线脉冲, 相互作用, 高阶效应

Higher-order Effects on Self-Similar Parabolic Pulses Interaction*

Abstract:

The interaction properties of the self-similar parabolic pulses (similaritons) with higher-order effects are firstly investigated in this paper.The numerical results show that the higher-order effects badly distort similariton shape,interacting in their overlap region and adjacent pulse as well.The influence of different higher-order effects on similaritons interaction is analyzed too.Additionally,we can get relatively high quality similaritons train transmission by amplitude modulation or pulse compression.These results are significant in the further study of high quality similaritons propagating in high-power ultrashort fiber amplifier,lasers and transmission systems.

Keywords: similariton, interaction, higher-order effects

收稿日期 2008-09-17 修回日期 2008-11-28 网络版发布日期 2009-10-20

DOI:

基金项目:

广东省科技攻关项目(2007B010400066),广东省自然科学基金(04010397);国家973项目

通讯作者: 刘伟慈

作者简介:

参考文献:

[1] ABLOWITZ M J,SEGUR H.Solitons and the inverse scattering transform [M].Philadelphia:SIAM,1981.

[2] ZHANG Q F,XU W C,FENG J,et al.Propagation properties of self-similar pulse in a dispersion-decreasing fiber with normal group-velocity dispersion [J].Acta Photonica Sinica,2008,37(01):30-34.

[3] TU C H,LEI T,ZHU H,et al.The ultra-short pulse evolution characteristic in self-similar parabolic pulse fiber amplifier [J].Acta Photonica Sinica,2008,37(05):879-882.

[4] DUDLEY J M,FINOT C,MILLOT G,et al.Self-similarity and scaling phenomena in nonlinear ultrafast optics [J].Nat Phys,2007,3: 597-603.

[5] FERMANN M E,KRUGLOV V I,THOMSEN B C,et al.Self-similar propagation and amplification of parabolic pulses in optical fibers [J].Phy Rev Lett,2000,84(26):6010-6013.

[6] KRUGLOV V I,PEACOCK A C,HARVEY J D.Exact Self-similar solutions of the generalized nonlinear schrodinger equation with distributed coefficients [J].Phys Rev Lett,2003,90(11): 113902(1-4).

[7] CHEN S H,YI L.Chirped self-similar solutions of a generalized nonlinear schr dinger equation model [J].Phys Rev E,2005,71: 016606(1-4).

[8] TOSHIHIKO H,MASATAKA N.Parabolic pulse generation by use of a dispersion-decreasing fiber with normal group-velocity dispersion [J].Opt Lett,2004,29(5): 498-500.

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(1120KB)
- ▶ 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

- ▶ 自相似抛物线脉冲, 相互作用, 高阶效应

本文作者相关文章

- ▶ 刘伟慈
- ▶ 徐文成
- ▶ 冯杰
- ▶ 陈伟成

[9] CHRISTOPHE F,GUY M,CYRIL B,et al.Experimental generation of parabolic pulses via raman amplification in optical fiber [J] .Opt Express, 2003,11(13): 1547-1552.

[10] KRUGLOV V I,PEACOCK A C,HARVEY J D.self-similar Propagation of Parabolic Pulses in Normal-dispersion Fiber Amplifiers [J] .J Opt Soc Am B,2002,19(3): 461-469.

[11] M CHIN D,IM S H,KRUGLOV V I,et al.Experimental demonstration of similariton pulse compression in a comblike dispersion-decreasing fiber amplifier [J] .Optics Lett,2006,31(14):2106-2108.

[12] ILDAY F O,BUCKLEY J R,WISE F W,et al.Self-similar evolution of parabolic pulse in a laser [J] .Phys Rev Lett,2004,92(21): 213902(1-4).

[13] B LANGER P A.On the profile of pulses generated by fiber lasers: the highly-chirped positive dispersion regime (similariton) [J] .Optics Express,2006,14(25): 12174-12182.

[14] OZEKI Y,TAKUSHIMA Y,AISO K,et al.Generation of 10 GHz similariton pulse trains from 1,2 km-long erbium-doped fibre amplifier for application to multi-wavelength pulse sources [J] .Electron Lett, 2004,40: 1103-1104.

[15] FINOT C,PITOIS S,MILLOT G.Regenerative 40 Gb/s wavelength converter based on similariton generation [J] .Opt Lett,2005,29: 1776-1778.

[16] PEACOCK A C,KRUGLOV V I,THOMSEN B C,et al.Generation and interaction of parabolic pulses in high gain fiber amplifiers and oscillators,Optical Fiber Communication Conference (OFC) [C] .Anaheim : Optical Society of America,2001: 13.

[17] FINOT C,MILLOT G.Interaction between optical parabolic pulses in a raman fiber amplifier [J] .Opt Express, 2005,13:5825-5830.

[18] LI Shu-qing,LI Lu,LI Zhong-hao,et al.Numerical research on the interaction of chirped ultrashort laser pulses with self-frequency shift [J] .Acta Photonica Sinica,2004,33(7): 862-866.

[19] LIU W C,XU W C,FENG J,et al.Higher-order effects on self-similar parabolic pulse in microstructured fiber amplifier [J] .Chin Phys,2008,17(03): 1831-1834.

[20] AGRAWAL G P.Nonlinear fiber optics [M] .New York: Academic Press,1995.

本刊中的类似文章

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	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="0421"/>
后槽由	<input type="text"/>		