Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Stretching of Picosecond Laser Pulses with Uniform Reflecting Volume Bragg Gratings. SERGIY MOKHOV, CREOL - the College of Optics and Photonics, Univ. of Central Florida — It is shown that a uniform reflecting volume Bragg grating (VBG) can be used as a compact monolithic stretcher of high-power picosecond laser pulses in cases when chirped Bragg gratings with an appropriate chirp rate are difficult to fabricate. A chirp-free reflected stretched pulse is generated of almost rectangular shape when incident short pulse propagates along a grating and experiences local Bragg diffraction. The increase in duration of the reflected pulse is approximately equal to twice the propagation times along the grating. We derived the analytic expression for diffraction efficiency, which incorporates incident pulse duration, grating thickness, and amplitude of refractive index modulation, enabling an optimum selection of the grating for pulse stretching. The typical expected theoretical value of diffraction efficiency is about 10% after taking into account the spectral narrowing of the reflected emission. We believe that the relatively low energy efficiency of the proposed method is more than offset by a number of advantages, which are chirp-free spectrum of a stretched pulse, compactness, robustness, preservation of setup alignment and beam quality, and tolerance to high power. Obtained pulses of several tens of picoseconds can be amplified by standard methods which are not requiring special measures to avoid undesirable non-linear effects. We propose a simple and reliable method to control the temporal parameters of the high-power picosecond pulses using the same laser source and the VGB of variable thickness that can significantly simplify the experiments requiring different pulse durations.

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Date submitted: 06 Nov 2015 Electronic form version 1.4