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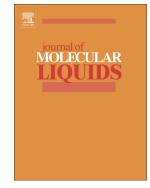
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Liquid crystal light valve with a semiconductor substrate for dynamic holography in the infrared

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Abstract

Recording of dynamic holograms in the near infrared spectral range is reported for a liquid crystal light valve with a GaAs semi-insulating substrate. The interaction of weak signal and strong pump waves are studied. It is demonstrated that an out-of-phase local dynamic grating is recorded. Optimal amplitude and frequency of the applied voltage are found for maximum amplification of the weak beam. Step-like external phase modulation of the signal wave with amplitude $\pi/2$ is used to change the type of response from local to nonlocal and to achieve in such a way additional transient signal beam amplification. Study of the cells with different thicknesses of the liquid crystal layer at different grating spacings allows a seventeen-fold gain of the weak beam in the device with the thickest liquid crystal layer of 16 µm at a grating period of 1000 µm (the largest possible in our set-up). The amplitude of the refractive index modulation and nonlinear coupling constant n_2 are estimated from the experimental results.

Keywords: liquid crystals; liquid crystal light valves; spatial light modulators; dynamic gratings; nonlinear optics.

1. Introduction

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