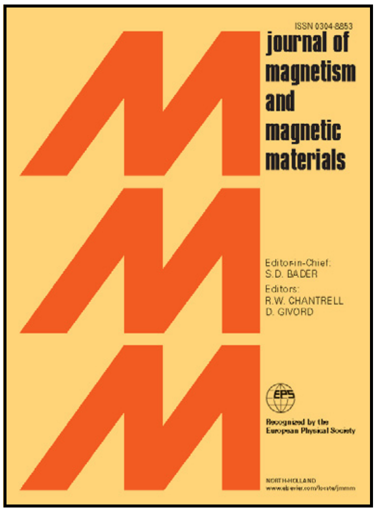
Author’s Accepted Manuscript



www.elsevier.com/locate/jmmm

Polarization gratings using ferronematics - An elastic continuum theory

Emil Petrescu, Rodica Eleonora Bena, Cristina Ci\widehatrtoaje

PII: S0304-8853(13)00100-5
DOI: http://dx.doi.org/10.1016/j.jmmm.2013.02.018
Reference: MAGMA58099

To appear in: *Journal of Magnetism and Magnetic Materials*

Received date: 10 December 2012
Revised date: 4 February 2013

Cite this article as: Emil Petrescu, Rodica Eleonora Bena and Cristina Ci\widehatrtoaje, Polarization gratings using ferronematics - An elastic continuum theory, *Journal of Magnetism and Magnetic Materials,* http://dx.doi.org/10.1016/j.jmmm.2013.02.018

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Polarization gratings using ferronematics - an elastic continuum theory

Emil Petrescu, Rodica Eleonora Bena and Cristina Cîrtoaje

University "Politehnica", Department of Physics, Splaiul Independentei 313, 060042, Bucharest, Romania, telephone: (40) 021 4103603, e-mail: cristina_cirtoaje@yahoo.com

Abstract

In our paper we apply the elastic continuum theory in order to describe the working of a polarization grating device based on the ferronematic liquid crystal and driven by magnetical field. Solving the Euler-Lagrange equations we obtain analytical expressions for the critical thickness and threshold magnetic field in strong and weak anchoring conditions. We discuss the influence of the ferroparticle presence and properties on the behavior of a device based on the ferronematic liquid crystal polarization gratings. We study also the dynamic behavior of this kind of device and we find the expression for switching *on* and *off* times. Our study may be useful in designing magneto-optical devices which include nanoparticles or microprocessed surfaces.

PACS numbers: 61.30.Dk, 42.79.Dj, 61.30 Hn

Key words: polarisation gratings, ferronematics, critical thickness, threshold field.

Accepted manuscript

1 Introduction

Liquid crystal gratings are optical elements characterized by periodic, spatially-varying, optically-anisotropic profiles, whose diffractive properties are useful in many optoelectronic devices such as displays, light modulators, optical storage devices and polarized beam splitters [1], [2], [3].

Liquid crystal polarization gratings (LCPGs) use liquid crystals as orientationally anisotropic media in which the eigenvectors of the dielectric tensor vary along the path of the light. Consequently, the polarization vector of the light emerging from the gratings can be changed periodically on the surface of the device. Liquid crystals are one of the best media for making polarization gratings because they are composed of highly anisotropic molecules

Download English Version:

https://daneshyari.com/en/article/8158725

Download Persian Version:

https://daneshyari.com/article/8158725

Daneshyari.com