

JEMNÁ MECHANIKA A OPTIKA

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Analysis of ellipsometric data obtained from a curved surface

(J. Křepelka).....297

This article deals with quantitative determination of the error following the ellipsometric data obtained from a curved surface including the influence of non-collimated beams. Numerical model, based on the combination of geometrical and wave optics, is restricted to the example of single dielectric layer deposited on the substrate with complex index of refraction. Three methods for averaging the possible measurable ellipsometric data are compared and analysed.

Keywords: ellipsometry, curved surfaces, non-collimated beams

Binarization of computer generated holograms using dithering noise

(P. Lobaz, L. Kovář)303

Theoretical limits of computers (I. Chajda).....306

We have shown that computation speed is restricted by means of Bremermann’s limit derived from fundamental laws of physics. One can easily find an example of algorithm for which Bremermann’s limit is broken and therefore it cannot be accomplished using any computer.

Object reconstruction in optics (A. Mikš)307

The paper deals with a brief description of the basic methods of reconstruction of the object in optics providing that we know the properties of the optical system forming image of the object and the image. There are presented general iterative methods, analytical methods and numerical methods based on sampling of the image process.

Nanolithography and Magnetic Field Cancellation in the Industrial Area

(V. Kolařík, F. Matějka, M. Horáček, M. Matějka, M. Urbánek).....312

The paper describes the results achieved by electron beam lithography when using an electron beam writer BS 600. The impacts of interference that are common in industrial areas are discussed. Electromagnetic field in the critical place i.e. along an electron beam axis is considered to be the predominant source of disturbances. An installation of a magnetic field cancelling system is described. The best resolution achievable in both cases (the magnetic field cancelling system being on or off) are presented. It is supposed that the results and experience described herein would be helpful when new laboratories and operations for nanotechnologies will be designed and built.

Keywords: E-beam writer with a shaped beam; magnetic field cancelling system; electron optics column; nanolithography; nanotechnology.

Data mining (I. Zelinka, M. Procházka).....317

Data mining is a set of methods for data processing with the aim to obtain non-trivial information not apparent at first glance usually due to the huge data volume or their complexity. This new scientific discipline helps to solve problems of this kind.

ICO rewards the lifelong work of a Czech scientist

(M. Hrabovský).....318

International Commission for Optics awarded Prof. Jan Peřina the 2011 Galileo Galilei Award for his impressive results on quantum optics and coherence achieved under difficult circumstances.

Geant and Sira (V. Havránek).....319

During a simulation of particle physics phenomena the optical effects sometimes appear, so the appropriate optical elements are then useful. This article describes the simulation of suitable optical lenses in the program pack Geant4.9.3. The quality of this simulation is evaluated in comparison with Standard Test Lens Sira 50 mm. The aim of this study is to help in deciding whether the Geant4 simulation of such optical elements corresponds to physical reality.

Keywords: Geant4, standard test lens Sira, bar scattering function, optical transfer function

Unified interpretation of the perturbed circulation of electrons or photons by means of Schrödinger equation

(J. Pospíšil, K. Šafářová).....323

The article is directed to presentation and analysis of the circulation of electrons or photons in an adequate isotropic metallic or dielectric ring by an external driving force under the uniform standpoint of a one-particle and one-dimensional nonrelativistic Schrödinger quantum equation. Simultaneously, the analogous momentum perturbations of these particles, produced by an external magnetic flux for electrons or by rotation of the carrying ring for photons, are assumed. The relations presented are utilized in the electrical or optical investigation and development practice, connected with the ring transmission and operation systems of electrons or photons.

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