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OBSAH

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Linear birefringence compensation in magneto-optical fiber sensors (P. Drexler, P. Fiala)..... 166

Basic properties of magneto-optical fiber sensors are presented for their using in the electric current and magnetic field measurements. The crucial sensors application problem consists in the intrinsic and induced linear birefringence deteriorating the sensor sensitivity. Some methods eliminating the linear birefringence are described. The selected method employing an orthogonal polarizing conjugation is analysed from theoretical point of view. On this basis the optical fiber current sensor is proposed and the analysis results verified.

Quantum concept of the configuration of electrons in mesoscopic semiconductors (J. Pospíšil, K. Šafářová)..... 172

Modern technologies enable the production of metallic and semi-conducting mesoscopic electron conductors of specific properties in comparison with the electrical conductors of macroscopic size scale. Generally, they are the structures whose effective dimensions are usually not larger than the wavelength associated to a moving electron and than its mean free path and the phase-relaxation length. The corresponding configuration of electrons and conduction processes require consequently a quantum approach. The dominant attention in this summarized text is directed successive to the useful starting gas model of electrons in a bulk or layer semiconductor, to their mobility, spatial quantum wavefunction, dispersion relation, density of quantum states, energetic quantum statistics, concentration and characteristic collision lengths and times. The formulae and considerations presented are of use not only in electronics, but also in opto-electronics and electro-optics.

Autofocus algorithm in a LIBS setup based on searching the best in-focus image (J. Novotný, R. Malina, J. Kaiser, M. Liška, M. Galiová, K. Novotný)..... 179

The article describes automation of 2-dimensional surface analysis in the apparatus for laser spectroscopy (LIBS). Such analysis

give us 2D map of presented chemical elements. The main part is dedicated to algorithm choosing suitable for evaluation of the image sharpness. Digital camera and ablation laser share the same focusing optics, so knowing the exact image sharpness it is possible to set sample object to focal plane. There are theoretically described and experimentally tested different kinds of methods how to obtain a relative sharpness number: gradient based method and methods working in frequency domain. Digital noise phenomenon is also discussed. As an output a selection of suitable method has been made with respect to its speed, accuracy and durability against digital noise.

Measurement of thin films magnetic properties by magneto-optical Kerr effect (R. Plšek, V. Uhlř, M. Urbánek, J. Spousta, T. Šikola)..... 184

A new apparatus for measuring magnetic properties of thin films has been built at the Institute of Physical Engineering (IPE) of BUT recently. In this paper we show a method for measuring magnetic properties by the longitudinal magneto-optical Kerr effect (MOKE). This method is based on polarization rotation of a light beam with rectilinear polarization reflected from a magnetic material. This so called Kerr rotation is proportional to the magnetization of the sample. For investigation of local magnetic properties of microstructures a microobjective focusing the beam on the sample is used. The sensitive area is limited by the spot diameter of cca 7 microns. The set-up was tested on magnetic thin films prepared at the IPE.

Research of behaviour of micro- and nanostructures in plasmonics on Institute of Physical Engineering FME BUT

(O. Tomanec, T. Hrnčič, L. Lovicar, L. Šustr, L. Břinec, R. Kaloušek, R. Chmelík, J. Spousta, T. Šikola.)..... 187

Propagation of surface plasmon polaritons on structures fabricated by application of focussed ion beam is investigated. Few types of structures were prepared on gold and aluminium thin films. Surface plasmon polaritons were locally excited and their transmission was studied. By focussed ion beam instrument were plasmonic resonant antennas created as well and resonance dependence on their geometry was investigated. Corresponding simulations by Finite-Dimension Time-Domain method were achieved.

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