

# JEMNÁ MECHANIKA A OPTIKA

VĚDECKO-TECHNICKÝ ČASOPIS  
ROČNÍK 52 2/2007

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Cena čísla 40 Kč včetně DPH

# FINE MECHANICS AND OPTICS

SCIENTIFIC-TECHNICAL JOURNAL  
VOLUME 52 2/2007

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## **Utilization of two- and three-dimensional optical analysis of the human eye optic disc in glaucoma diagnostics**

(F. Pluháček, J. Pospíšil, T. Kuběna) ..... 31  
Changes of the blind spot (optic disc) of the human eye retina are the first symptoms of glaucoma. Their detection and suitable numerical representation can be performed on the basis of evaluation of two- or three-dimensional data, which are obtained by a suitable optical scanning of the optic disc. This article provides the description of two concrete methods: the newly proposed method of image analysis of color digital images of the optic disc for detection of color and brightness glaucomatous changes within the optic disc and the known method of the laser scanning tomography for observation of the topographical changes of the optic disc. The main part of this article comprises comparison of diagnostic usability of the relevant numerical parameters, which are characteristic for the above-mentioned methods. For this purpose, both methods were applied to the statistical set of 480 healthy and glaucomatous eyes.

**Optometry study in 2006** (J. Wagner, F. Pluháček) ..... 35

**Trade fair OPTA in Brno** (V. Malíšek) ..... 36

## **Polarisation optical reflectometer for fiber sensors with distributed parameters**

(M. Hlaváč, J. Jasenek, J. Červeňová) ..... 37  
In this article we describe the fiber optics reflectometer that we are actually developing at our workplace. The device integrates some nonconventional technologies. Principles of integrated photonic technologies are explained here. Reflectometer will be deployed as a sensor for distributed sensing of physical fields along the optical fiber. Key details of device implementation are disclosed here according to fiber optics, electronics, and thermodynamics.

## **The modification of Gaertner L119 ellipsometer and its use for thin-film structures study**

(M. Lesňák, J. Luňáček, A. Talík, P. Hlubina, J. Pištora) ..... 40  
This article deals with modification and renovation of the ellipsometer Gaertner L119 and its using for thin-film structures study. The measurement process is fully automatized. The device works at constant wavelength in PCSA null regime and the data are obtained for various angles of incidence. The system was tested on a set of SiO<sub>2</sub> thin-films prepared on Si single crystal wafers by thermal oxidation at 1200°C. The thicknesses obtained from experiment were compared with the results obtained by using of Yamaguchi type spectral ellipsometric system as well as with the data determined from white-light interferometry and spectral reflectometry.

**Keywords:** Ellipsometry, thin films.

**OCULUS: Advanced technology for opticians and ophthalmologists** (J. Šandera) ..... 42

**Actualities in photovoltaics** (M. Libra, V. Poulek) ..... 43

In September 2006 „21<sup>st</sup> European Photovoltaic Solar Energy Conference and Exhibition“ was organized in Dresden. Approximately 2000 participants and 385 exhibitors was registered. This paper speaks about some actualities from this exhibition.

## **Evaluation of the modulation transfer function of a digital video-camera by means of the power spectral density of a reflection random chart and its image**

(J. Pospíšil, P. Jakubík, F. Pluháček) ..... 45  
A possible optimal way of measurement and computer evaluation of the locally-shift invariant modulation transfer function of a given digital video-camera in its photographic regime is described in this article. Such a way is based on exploitation of the power spectral density of a static two-dimensional reflection random chart, incoherently illuminated by the white light, and its digital electro-optical image. This chart simulates the white-noise distribution. For its production and for evaluation of the image-data, the specially developed computer programs were exploited under framework of the computer tool MATLAB 6.5. The chosen evaluational procedure follows from the presented spectral transfer equations containing the squared modulation transfer function which was then smoothed needfully in addition. Some obtained results are presented graphically under the pixel scale of relative spatial frequencies and also evaluated in view of the utilized different camera pixel resolutions and image gathering quality levels. They demonstrate the possibility of the exploited evaluational way to compare the image quality of the digital video-camera under chosen imaging conditions already mentioned.

## **Aluminium surface quality statistical evaluation at abrasive waterjet cutting**

(S. Hloch, J. Valíček) ..... 51  
Article deals with stastical evaluation of aluminium surface quality created by means of abrasive waterjet. It was evaluated the influence of the factors on the surface quality in 1, 6 and 11 mm depth. According statistical evaluation of the surface quality by means of factor analysis, results that for the evaluation of the quality average roughness is insufficient.

**Yuri Nikolaevich Denisyuk, the second one from two founders of modern holography, passed away** (M. Miler) ..... 55

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