

JEMNÁ MECHANIKA A OPTIKA

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The possibilities of software application Photostress demonstrates separation of the principal normal stresses with method of oblique incidence

(F. Trebuňa, P. Frankovský, A. Kostelníková)..... 63
The contribution refers on the accelerating of the process method of stress analysis using PhotoStress software applications *PhotoStress*. *PhotoStress* application was developed for the analysis of the direction and size of the main strain respectively the analysis of the main normal stresses on the loaded photoelastic coated structural elements on the authors workplace. It accelerates the process of measurement and evaluation of major strains and principal stresses at a point on the line or a curve respectively. It allows in these entities determining the direction and size differences and separated values of major strain or the stresses on the basic of the photo of loaded photoelastic coated objects. In the paper is describing the application *PhotoStress* and the view of the separation of the main normal stresses at using the method of oblique incidence photoelastic coated steel ring and also a comparison of results obtained *PhotoStress* software application and numerical solution, by the finite element method.

Output of an optical beam from a single mode fibre

(T. Martan, M. Miler)..... 72
An analysis is performed in the article of an output and propagation of a coherent light beam outgoing from a single frequency optical fibre supposing an inclined termination of the fibre, and also an analysis of a transformation of such a Gaussian beam of an ideal lens. Direct transformation performed analogously to the input beam gives the same result as a calculation of the diffraction on the lens if the beam is not apertured. For characterization of the beam transformed by the lens the concept of the Fresnel number of the Gaussian beam is used.

Fractals and their dimension

(I. Hamarová, P. Šmíd, P. Horváth, M. Hrabovský)..... 78
This article is a digest of fractal geometry including various definitions of fractals and their typical attributes. A great attention is paid to the fractal dimension as a basic parameter characterising the fractal nature. Also a list of significant fractal dimensions and recipes for their calculation is presented what can be considered as a ground for fractal analysis interfering in more and more scientific fields not excepting optics.

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Progress in the field of collimated X-ray sources and their application for small-angle scattering

(K. Végső, P. Šiffalovič, M. Jergel, M. Benkovičová, E. Majková)..... 82
In this article, we present a novel device dedicated for the grazing-incidence small-angle X-ray scattering measurements on solid and liquid surfaces. Presented apparatus includes the last generation of compact X-ray microfocus source with the total power consumption less than 30 W and focusing X-ray optics. The Montel optics consists of parabolically curved and laterally graded multilayer

mirrors. The first experimental small-angle X-ray scattering results of nanoparticle self-assembled array demonstrate excellent performance of developed instrument.

Concept of Conversion Formula of Sensors with Piezoresistive Elastomers (P. Děd, G. Künzel)..... 84

An article describes a concept of a conversion formula of sensors containing piezoresistive elastomers. The dependence of resistance on applied pressure in given time period was measured. In this way the characteristics of sensor $R = f(p)$ by $t = \text{const.}$ and $R = f(t)$ by $p = \text{const.}$ were obtained. These characteristics were also analysed and on this base the transfer formula of the sensor was designed.

Comment to the units in optical metrology

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The best start of your growth - engineering trade fair in Prague

(H. Marková)..... 91

ANOTACE

Nelineárne rozšírenie spektra femtosekundových impulzov Cr:Forsteritového lasera vo viacložkových sklách (L. Haizer, I. Bugár, D. Lorenc, R. Buczyński, F. Uherek)..... 67

Interakcia energetických femtosekundových laserových impulzov s viacložkovými sklami bola študovaná. Nelineárna interakcia bola analyzovaná na základe registrácie rozšírenia spektra, ktorá bola zapríčinená hlavne javom samomodulácie fázy. Zdrojom impulzov bol femtosekundový Cr:Forsteritový laserový systém generujúci impulzy na vlnovej dĺžke 1240 nm s gigawattovými špičkovými výkonmi. Pomocou rozličných viacložkových skiel bola identifikovaná lineárna závislosť medzi rozšírením spektra a nelineárnym indexom lomu n_2 , získaným z predošlých meraní metódou Z-scan. Okrem toho korekcia na reálnu interakčnú intenzitu bola prevedená, do ktorej boli zahrnuté odrazové a absorpčné straty vzoriek, vedúca k značnému zlepšeniu linearity študovanej závislosti. Výsledky ukazujú rozumnú koreláciu s hodnotami získanými experimentálnou metódou Z-scan pri vzorkách s menším nelineárnym indexom lomu. Použitím vhodnej referenčnej vzorky so známym n_2 predkladaná metóda môže byť využitá na približné určenie nelineárneho indexu lomu ľubovoľnej novej vzorky.

Kľúčové slová: nelineárny index, viacložkové sklá, samomodulácia fázy, femtosekundové impulzy, spektrálne rozšírenie, energetické straty (odrazivosť, absorpcia)