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OBSAH

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Local topography of opto-electronic substrates prepared by plasma etching (D. Dallaeva, S. Ramazanov, E. Prokopyeva, J. Brüstlová, P. Tománek).....299

Sapphire Al_2O_3 and silicon carbide SiC are interesting materials for the construction of optical and electronic components operating in extreme conditions. The surface quality of the etched substrate affects the quality of the whole device. The article presents the results of investigation of the effect of substrate tilted to the direction of flow of argon plasma reaching maximum of dry etching. For the measurement of this dependence Linnik interferometer, and for controlling the local morphology and topography of the etched substrate AFM microscopy were used. Statistical and correlation analysis of experimental results were then used to estimate the quality of the surface.

Development of large aperture composite adaptive optics

(V. Kmetík, B. Vítovec, L. Jiran, Š. Němcová, J. Zícha, A. Inneman, L. Mikuličková, R. Pavlica).....303

In cooperation between the Institute of Plasma Physics, Department of Instrumentation and Control Engineering FME CTU and 5M Ltd. large aperture composite adaptive optics for laser applications is being created. We are investigating the opportunity of production of a large-size high-power-laser deformable-mirror using a lightweight actively actuated bimorph structure with a composite core. In order to produce a sufficiently large aperture of a deformable mirror, we are developing new technologies for production of flexible core, bimorph actuator and thin deformable mirror reflector. We prepared a full simulation of a deformable-mirrors structure and validated it by a set of measurements and testing. An active actuation of deformable mirror and a response of a complicated structure were investigated for purpose of an accurate control of the adaptive optics. An original adaptive optics control system and a unique bimorph deformable mirror driver were developed. At first, tests of material samples, components and sub-assemblies were completed. Later a subscale 120mm bimorph deformable mirror prototype was designed fabricated and thoroughly tested. A large-size 300mm composite-core bimorph deformable mirror was simulated and optimized using numerical and physical models, a fabrication of a prototype is carried on. A measurement and testing facility is modified to accommodate large size optics.

Keywords: large aperture, adaptive optics, deformable mirror, bimorph deformable mirror, composite optics

Invitation to 116th Deutsche Gesellschaft für angewandte Optik annual meeting 2015 in Brno (P. Tománek).....307

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Influence of pupil size and rotation on aberration coefficients and refractive errors

(T. Černohousová, T. Kahounová, J. Novák, P. Novák) 309
This work describes an analysis of the pupil size influence on aberration coefficients and total aberration of the eye. The change of the pupil size on refractive errors obtained by objective refraction using aberrometry is calculated. The resulting objective refractive errors are compared to manifest refraction for a different pupil size. It is also analyzed the influence of the rotation of the eye on Zernike aberration coefficients and refractive errors for eyes with different level of aberrations. Selected methods are described of the calculation of refractive errors using aberrometry. Further, these methods of the calculation of refractive errors are analyzed for eyes with different levels of high-order aberrations. Measurements from the aberrometer are compared to measurement with

the autorefractometer and subjective evaluation of refractive errors using trial lenses.

Keywords: wave aberration, aberrometry, Zernike polynomials, pupil transform, refractive errors

Three-elements zoom system for transformation of Gaussian beams (A. Mikš, P. Kulmon).....316

Authors derive general relations describing paraxial optical properties of a three-elements zoom system for transformation of Gaussian beams. It is shown that such optical systems have different kinematics in comparison with zoom systems for transforming homocentric bundle.

FTM interferometry of the residual deviations of optical surfaces – the comparison of classical approach with evaluation by piecewise quadratic function (P. Pokorný).....320

This paper compares the classical FTM approach of interferogram evaluation with a solution which uses the piecewise quadratic function. The analysis is carried out on a real data obtained by the phase shifting interferometry which is considered to be the most accurate in practice at this time. However, compared with the FTM, it puts greater demands on the conditions of measurement and its inclusion into the production is limited and expensive. Therefore, development of the methodology and algorithms which allow the implementing of interferometrical measurement to the process of production is in the centre of focus. The FTM is one of the suitable methods; it satisfies processing demands and economical part as well.

Keywords: FTM interferometry, phase reconstruction, piecewise quadratic function

Methods of interferogram evaluation for the measurement of the deformations of surfaces and wavefronts (P. Pokorný) ..324

This paper presents and compares fundamental methods for interferogram evaluation, which are used during the deformation measurements of surface shapes and wavefronts. The fundamental model and its uncertainties are described. Afterwards, the author presents solution by carrier frequencies both in spatial and temporal domain. Several methods which do not require the carrier are presented as well. At the end of the paper, the chosen algorithms are compared with simulated data.

Keywords: interferogram, phase retrieval, fringe pattern analysis

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Palacky University student fraternity UP Crowd promotes science (J. Tomáščík).....332

International Year of Light and Light-based Technologies (M. Selingerová).....333

The United Nations General Assembly together with UNESCO proclaimed 2015 as the International Year of Light and Light-based Technologies after a global initiative of scientific, cultural and educational institutions, non-profit organisations and associations, technology platforms and commercial partners. Briefly, light beams incident everyone and they are about to be celebrated by the whole planet.

Response of European Committee for Standardization to the Decision of European Commission (M. Miler).....334