

# JEMNÁ MECHANIKA A OPTIKA

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**Development of testing method for optical components used for elementary particles detection (D. Snopek)..... 100**

The goal of this article is a presentation of new method used in optical experiments. The treated component is a spherical mirror of a composed objective built in the elementary particles detector. A principle of this measuring method consists in the separation of the consistent beam into single elementary rays and in analysis of their propagation direction. The real shape of the optical surface can be derived from the direction of rays reflected from the mirror.

**Similarities of photon and electron waves in mesoscopic conductors (J. Pospíšil, K. Šafářová)..... 103**

Some analogies, related to propagation and interference of photons and electrons under the framework of linear electromagnetic (photon) and electron optics of actual so-called conductive (transporting) media, are presented in the article. The attention is directed concretely to correspondence of motion equations, dispersion relations and ray and interference aspects of ballistic and diffuse propagating photons and electrons. The considerations are completed by conditions for the coherence of adequate waves and for the possibility of electrostatic and magnetostatic influence of the interference and the electrical conductance of electron waves and their diffuse fluctuations.

**Windowed Fourier transform and wavelet transform applied to the phase retrieval of the spectral interference signal**

(J. Luňáček, M. Luňáčková, P. Hlubina, D. Ciprian)..... 111

This paper presents a new method of the spectral interference signal processing based on the windowed Fourier transform (WFT) and wavelet transform (WT) applied in the wavelength domain. The numerical simulations were performed to demonstrate the precision of the phase retrieval from the spectral interference signal. The phase error distribution function as a function of the wavelength was illustrated. The results show that the higher precision of the phase retrieval was obtained by WFT method with suitable parameters: window width and threshold. Key words: Windowed Fourier transform, wavelet transform, retrieved phase, spectral interferometry, white light

**Novel design of tactile sensors – a basic measurement of particular measuring points of scanning matrix required for sensor calibration (A. Trinkl) ..... 114**

This article deals with a new design of the system for planar measurement of static and dynamic stress distributions developed for

walk analyse, sole and sitting stress distribution and indication of big joints condition. A system test sample measured by a special device consists from a sensor with eight equidistantly distributed sensing elements (2 x 4 matrix) at the 13 mm<sup>2</sup> x 23 mm<sup>2</sup> area.

**Application of three-point tractor hitch for traction measurement (M. Kroulík, F. Kumhála, J. Hůla, V. Prošek, M. Zlínský, J. Kmoč)..... 117**

A known value of traction force used for a machine hauling can be used in practice for an energy consumption comparison of soil cultivation methods, verification of technical machine changes, optimisation of machine adjustments, approval of agricultural land interventions and mapping of soil environment variability. In this article the traction measurement during machine labour using the electro-hydraulically regulated hitch is described. Two tractors (John Deere 8320 and Fendt 933 Vario) with installed power hinge three-point pins from serial production were calibrated. In both cases the linear dependence between traction force and output stress of power pins was approved. The dependence between output sensor voltage of arms position and arms height above the support is also linear.

**Vladimír Malíšek celebrating (M. Miler) ..... 121**

**Application of CCD camera for determination of bio-sample rheological characteristics (J. Zeman, J. Bok) ..... 122**

This article deals with an application of a common high-resolution camera Cannon 350D together with a tensile tester Instron 4464 for determination of some sample material characteristics. From photo records of a deformation test there can be determined the volume sample compressibility and its Poisson ratio. The range of the measurement possibilities were tested on the potatoe segment. Some results of compressibility and a volume of extruded liquid during the relaxation process are presented.

**Prof. RNDr. Dr. Zdeněk Bouchal – in his fiftieth (M. Hrabovský, J. Nevřala)..... 125**

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