

# JEMNÁ MECHANIKA A OPTIKA

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## Measurement of window glass luminous transmittance

(M. Vik, M. Viková, V. Čejka).....95

In an automotive industry there is used laminated glass due to the safety reasons. In the event of the cracked glass it can be fixed by an interlayer, typically from polyvinyl butyral (PVB) inserted between two or more glass layers. Standard methods of haze measurement are unable to cover whole effect, which we are able to see during visual assessment of such a glass. The paper describes a modified method of measurement optical properties of window glass, allowing replacement of subjective evaluation by objective one.

**Keywords:** HAZE, auto glass, spectrophotometry

## Quality evaluation hardening gears method of analysis

### Barkhausen noise and X-ray diffraction

(L. Schmidová, T. Bakalova, Z. Rozek).....98

Nowadays there are high demands on quality and especially durability of machine parts. An integral part of the manufacturing methods and processes are chemical-heat treatment. This article deals with an evaluation of different methods of case-hardening technology. Evaluation of influence of the method of case-hardening to the surface quality of the components (in this case, (wheels) was performed using the methods of analysis of the Barkhausen noise, and X-ray diffraction.

**Keywords:** case-hardening, method of analysis of the Barkhausen noise, RTG diffraction, wheels

## The detection of decarburization of austempered iron ADI/AGI/AVGI by the magnetic spot-pole

(Z. Andršová, L. Voleský, B. Skrbek, P. Zdobinská).....101

The austempered ductile iron (ADI), austempered grey iron (AGI) and austempered vermicular-graphite iron (AVGI) represent the most progressive group of graphitic irons with reference to mechanical properties. However, these properties depend on accurate observance of default structure, chemical composition and isothermal hardening conditions. ADI/AGI/AVGI casts are used in the wide spectrum of industrial applications, mostly for moving parts and safety critical items. The production of ADI/AGI/AVGI in the Czech Republic is insufficient. That's why the systematic research of non-destructive structuroscopy is necessary. This paper describes a part of research, which is focused on decarburization. It is one of the most frequent undesirable effects, originating when the rules of technological process are not observed and the casting is exposed to oxidizing atmosphere. Decarburization has a negative effect on final mechanical properties of the casting and must be detected in time – this part of the work deals with possibilities of detection using magnetic spot-pole method, which was successfully used for steels. Paper also explains some important specifics of austempered irons which may effect the measurement.

**Keywords:** austempered iron, decarburization, magnetic spot-pole method

## Reaction of grass seed exposed by atmospheric plasma

(D. Tichý, P. Hájková) .....104

This work is focused on the observation of the influence of cold atmospheric dielectric barrier discharge (DBD) on grass seeds germination and its early growth. The samples of seeds were exposed for 1 s, 3 s, 5 s, also samples without exposure were kept for analysis. An ambient air was used as a working gas for DBD plasma. The evaluation was carried out by monitoring of germination and early growth (increase of cumulative sprout length) of a sample of grass seeds during the first 10 days. The analysis of the surface of modified seeds to observe possible damage during exposure in a plasma discharge was done. The results varied depending on the interval of exposure of treated seeds.

**Keywords:** DBD plasma modification, germination, modification

## PHOTOCHROM - The unique device for measurement spectral and colorimetric properties photochromic dyestuffs

(M. Viková, M. Vik) .....107

In this article a unique device concept for photochromic measurement in reflectance mode together with methodology is described and this has been patented in the Czech Republic in the author's name. Spectrophotometer PHOTOCHROM allows the measure colorimetric and spectral characteristics of photochromic textiles as photochromic sensors and also the fatigue test for the control of color change stability. This concept of colorimetric and spectral parameters allows also finding the dependence of color change on intensity of UV irradiation and temperature. In this article we would like to demonstrate the main advantages of this measuring device.

**Keywords:** spectrophotometer, photochromic pigments, exposure and reverse phase

## Potential applications of computed tomography

(T. Bakalova, M. Kolínová) .....111

This article focuses on implementation of computed tomography (CT) in the study of 2D and 3D microstructures of different materials – textiles and biological structures, geopolymers with different fillers etc. Computed tomography demonstrates the different densities of material in different sections, provides information on the distribution of fillers or air bubbles in the volume studied structures, very reliably determines the occurrence of defects or cracks in the volume. Furthermore the subsequent analysis of several successive sections allows to build up a 3D visualization of the object.

**Keywords:** computed tomography (CT), 2D and 3D microstructures, 3D visualization

## Phase evaluation in interferometry using piecewise quadratic functions (P. Pokorný).....114

This paper presents a simple method for a phase reconstruction in interferometry using piecewise quadratic functions. Generally, main principle is very simple and phase unwrapping is not needed; therefore, this method can be easily implemented into computational processing in real applications.

**Keywords:** interferometry, phase gradient, phase reconstruction

## Photovoltaic Panels with Silicone Gel (V. Poulek) .....119

The new generation of the photovoltaic (PV) panels has been developed. New silicone gel encapsulation was compared with the standard EVA lamination of PV panels. Corrosion of the silicone gel laminated PV panels is negligible in comparison with EVA laminated panels. Silicone gel laminated c-Si PV panels were prepared and tested at 3.5 times concentrated solar radiation. The transparency decreasing induced by UV radiation is smaller in silicone gel lamination in comparison with EVA-laminated PV panels. The lifetime could be up to 50 years in the case of silicone gel laminated PV panels.

## Two stage application of wavelet transform for denoising and phase analysis of ESPI correlograms with use of intensity threshold (L. Stanke, P. Šmíd, P. Horvát) .....122

Paper presents data processing of correlograms acquired by an electronic speckle pattern interferometry (ESPI). Speckle pattern causes that correlograms are highly noised. Consequently a special care has to be taken for correlogram denoising before the calculation of demanded phase map or profile. Paper shows a process that utilizes two stage application of the wavelet transform (WT) for either denoising and phase retrieval. Correlogram denoising is performed in the first stage by the thresholding of the wavelet transform coefficients. Unlike the typical usage, WT phase retrieval process is not directly utilized to the denoised correlogram, but rather to its intensity thresholded image, which is done in the second stage. Proposed algorithm is verified by its application to the artificially created correlograms and in the final step also to the experimentally acquired correlograms.

## Workshop on the precision optics manufacturing

(L. Stanke).....123