

# JEMNÁ MECHANIKA A OPTIKA

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## OBSAH

**Dny otevřených dveří pracovišť Akademie věd  
ve Fyzikálním ústavu AV ČR (F. Máca).....** 291

**Analogické kvantové pohybové rovnice elektronových  
a fotonových vln v izotropních prostředích  
(J. Pospíšil, F. Pluháček).....** 293

**Modelování teplotních diferencí ve skleněných výliscích po  
tepelných úpravách v elektrické peci  
(M. Havelková, P. Schovánek).....** 297

**Osová difrakce na kruhové apertuře pro sbíhavou  
kulovou vlnu (M. Hradil, M. Miler).....** 300

**Pojmy, názvy a jednotky v optické metrologii  
(M. Miler).....** 307

**Vliv koncentrace zpevňujících částic na vlastnosti  
polymerních kompozitů  
(M. Müller, M. Brožek, J. Slabý, A. Proshlyakov).....** 314

**Měřicí technika pro kontrolu jakosti.....** 318

**Výroční schůze Evropské optické společnosti (EOS)  
v Paříži (P. Tománek).....** 319

**Objev nového materiálu pro stálé elektronické paměti  
(Red.).....** 320

**110 LET RENTGENOLOGIE NA MORAVĚ (J. Kůr).....** 320

**Využití jedinečné technologie při výrobě maziv.....** 322

**OPTONIKA 2011 – 2. veletrh optické  
a fotonické techniky.....** 323

**VIENNA – TEC 2010 (J. Kůr).....** 324

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## CONTENTS

**Open door days in the Institute of Physics, Academy  
of Sciences, Czech Republic (F. Máca).....** 291

**Analogous quantum motion equations of electron  
and photon waves in isotropic media  
(J. Pospíšil, F. Pluháček).....** 293

**FEM Simulation of thermal differences in semi finished  
glass pieces after heat treatment in electric furnace  
(M. Havelková, P. Schovánek).....** 297

**On-axis diffraction at a circular aperture for a convergent  
spherical wave (M. Hradil, M. Miler).....** 300

**Terms, names, and units in optical metrology  
(M. Miler).....** 307

**Hardening particles concentration influence on polymeric  
composite properties  
(M. Müller, M. Brožek, J. Slabý, A. Proshlyakov).....** 314

**Measurement techniques for quality control.....** 318

**Annual meeting of the European Optical Society (EOS)  
in Paris (P. Tománek).....** 319

**Discovery of a new material for the permanent electronic  
memory (Red.).....** 320

**110 years of roentgenology in Moravia (J. Kůr).....** 320

**Using unique technology in production of grease.....** 322

**OPTONIKA 2011 – 2nd fair of optical and photonic  
technique.....** 323

**VIENNA – TEC 2010 (J. Kůr).....** 324

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# CONTENTS

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**Open door days in the Institute of Physics, Academy of Sciences, Czech Republic** (F. Mácá) ..... 291

**Analogous quantum motion equations of electron and photon waves in isotropic media**

(J. Pospíšil, F. Pluháček) ..... 293

The formulations and interpretations of some formally analogous expressions of the single-particle scalar quantum wave equations of electrons and photons, propagated in adequate isotropic static media under weak signals and interaction phenomena, are presented in this article.

**FEM Simulation of thermal differences in semi finished glass pieces after heat treatment in electric furnace**

(M. Havelková, P. Schovánek) ..... 297

Semi finished glass pieces are moulded in the furnace to template forms not only to fit their shape but also to reduce internal stresses. Thermal differences are unwanted and have to be minimized in the cooling procedure of the glass pieces. Simulations of various types and sizes of shaping forms and complex model cooling were accomplished. The aim of these simulations was to optimise geometric parameters, clamping conditions and material of the form, so that thermal differences at glass are minimized during the cooling.

**Keywords:** Heat treatment, Numerical simulation, Finite element method (FEM)

**On-axis diffraction at a circular aperture for a convergent spherical wave** (M. Hradil, M. Miler) ..... 300

The article is devoted to diffraction at a circular aperture. In this connection, only Fraunhofer diffraction of a plane wave focused by a lens is usually investigated as it has important consequence for the resolution ability of optical instruments. Here, main attention is given to the diffraction pattern on the longitudinal axis, which is important for resolution ability of the stratified depth recording of information. For low Fresnel numbers, the displacement of focused intensity arises compared to the location of the geometric focus, and the zero maximum is very broad. On the contrary, for high Fresnel numbers, which take place for usual optical instruments, the displacement is negligible and the zero maximum is relatively narrow.

**Terms, names, and units in optical metrology** (M. Miler) ... 307

The article is presentation and critical analysis of energetics of radi-

ant and luminous fields. It is based on contemporary international and Czech standards. An impulse to its writing was an article on the matter in this Journal (see P. Oupický: Radiometry a fotometry, Jem. mech. opt. 53/7–8 (2008) 211–14). Some arguments of the article are corrected but also some things of the standards do not remain away from criticism. The article can serve all who look for a comprehensive review on this field.

**Hardening particles concentration influence on polymeric composite properties**

(M. Müller, M. Brožek, J. Slabý, A. Proshlyakov) ..... 314

Abstract: A development of new materials is a base for a growth of all human activity branches. Polymers and materials on their base are probably the most used and the most developing group. Mainly polymeric composite materials have become industrial products used in a huge number of human activity areas these days. The polymeric particles composites are one of the part which this paper deals with. The subject of carried out experiments was the polymeric particle composite with its continuous phase in a form of two-component epoxy adhesive and non-continuous phase (a hardening particle) in a form of corundum –  $Al_2O_3$ . The influence of a different volume portion of hardening particles on mechanical quantities and an abrasive wear was mechanically found out with the aim to improve material properties and to increase their usage in various application fields.

**Keywords:** abrasive wear, filler, mechanical properties, matrix, particle composite

**Measurement techniques for quality control** ..... 318

**Annual meeting of the European Optical Society (EOS) in Paris**

(P. Tománek) ..... 319

**Discovery of a new material for the permanent electronic memory** (Red.) ..... 320

**110 years of roentgenology in Moravia** (J. Kůr) ..... 320

**Using unique technology in production of grease** ..... 322

**OPTONIKA 2011 – 2nd fair of optical and photonic technique** ..... 323

**VIENNA – TEC 2010** (J. Kůr) ..... 324