

# JEMNÁ MECHANIKA A OPTIKA

VĚDECKO-TECHNICKÝ ČASOPIS  
ROČNÍK 56 7 - 8/2011

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Cena čísla 40 Kč včetně DPH

# FINE MECHANICS AND OPTICS

SCIENTIFIC-TECHNICAL JOURNAL  
VOLUME 56 7 - 8/2011

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## Physical investigation methods for artistic works

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## Cost and productivity of thermal cutting methods and their effect on construction steel properties

(M. Harničárová, J. Valíček, J. Zajac) ..... 208

This work compares thermal cutting processes from the point of view of a thermal interference depth of the cut edge effective for construction steel EN S355J0 and deals with a cost and productivity of various cutting technologies. Results allow to estimate the technologies on the base of the mechanical changes in the cut edges, to determine their advantages and drawbacks and to look inside the technical/qualitative process characteristics.

**Keywords:** thermally interfered area, productivity, cost

## The effect of an additional thermal insulation on the transponders' behaviour

(M. Růžička, M. Linda, G. Künzel) ..... 214

Object identification in high temperature environment by means of RFID technology faces an obstacle in the form of protection of the transponder's electronic circuits. Some transponder's concepts protect the electronic circuits against temperature increase by application of a thermal insulating section. Another concept does not use this insulating section.

The article describes the usage of a simulation tool of internal transponder temperature evaluation with the aim of internal temperature prediction. The successful solution would contribute to

a reduction of production line downtime and to the maximalisation of production line capacity.

## Simulation of behavior of quantum dot in electrostatic fields

(P. Hruška, L. Grmela) ..... 216

Paper deals with behavior of a nanostructure in electrostatic fields. The nanostructure contains a Si quantum dot, embedded in SiO<sub>2</sub> surroundings. Paper presents the results of numerical evaluations of ground states, wave and probability functions of the states at varying values of the fields. Remarkable change of the amplitude wave function maximum, that occurs at a certain field bias value is elucidated as the quantum dot emission. Numerical data on the electron potential energy and the nanostructure quantum states parameters are obtained by solution of the Poisson and Schroedinger PDE equations applying the FEM method. 2D Poisson-Schroedinger model (PSM), for Comsol Multiphysics Program was prepared by the paper authors.

**Keywords:** Quantum Dot, Nanostructure, Comsol MultiPhysics, Poisson- Schroedinger model, Emission bias

## The effect of plane-parallel plate on lens image distortions

(A. Mikš, P. Pokorný) ..... 220

This article deals with the theory of distortion in the optical systems. The general relation for relative distortion is derived. This relation is valid for all cases of the optical systems in real practice. Further the condition for the independence of the distortion in the optical systems on location of the object is shown. In the next part the aberrations induced by the plane parallel plate placed behind the optical system with not too big numerical aperture and angle of view are analysed. There are derived relations for the acceptable thickness of the plane parallel plate, which does not induce detectable degradation of image in the image plane.

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