BALTIC POLYMER SYMPOSIUM 2010

PALANGA

September 8–11, 2010

PROGRAMME AND ABSTRACTS

KAUNAS UNIVERSITY OF TECHNOLOGY

VILNIUS UNIVERSITY

BALTIC POLYMER SYMPOSIUM 2010

PALANGA

September 8–11, 2010

PROGRAMME AND ABSTRACTS

TECHNOLOGIJA
KAUNAS - 2010

GEOMETRICAL PARAMETERS EVALUATION IN OPTICAL METHODS OF RELIEF REPLICATED IN PHOTOPOLYMER

J. Pudlauskaitė, V. Jankauskaitė
Faculty of Design and Technologies, Kaunas University of Technology,
Studentų g. 56, Kaunas LT-51424, Lithuania
E-mail: jovita.pudlauskaite@ktu.lt

P. Narmontas
Institute of Physical Electronics, Kaunas University of Technology,
Savanorių pr. 271, Kaunas LT-50131, Lithuania

In the present research the influence of UV irradiation duration on trimethylolpropane ethoxylate (14/3 EO/OH) triacrylate photopolymer geometrical parameters and layer optical properties has been investigated. Two-stage exposure to UV light of photopolymer was used (before and after microrelief embossing). Photopolymer was partially cured by exposure to UV light at different time (5 s, 15 s, 40 s).

Time Variations of UV radiation leads to the different parameters of formed grating which makes effect to diffraction efficiency of replication. Diffraction efficiency of diffraction gratings was measured experimentally and estimated using linear dimensions of grating defined by atomic force microscopy (AFM) and scanning electron microscopy (SEM). The main experiment results were compared with the computer simulations software (PCGrate) were employed to calculate diffraction efficiency of different geometrical parameter of diffraction grating.

Studies have shown that modeling a geometric pattern profile grating may be selected depth, which will provide the maximum diffraction efficiency. Comparison of experimental diffraction efficiency and simulated results illustrates reliability and quality of this approach.

SIMULATION OF GLASS FIBER/POLYMER COMPOSITE IMPACT RESPONSE IN NON-LINEAR FINITE ELEMENT PROGRAM: LS-DYNA

S. Zike, K. Kalnins, K. Dzelzitis, O. Ozolins
Institute of Materials and Structures, Riga Technical University,
Kalku st. 1, LV-1658 Riga, Latvia
E-mail: sanita.zike@gmail.com

The aim of research is to adjust composite simulation models given in LS-DYNA to real composite material impact response data. The purpose is to work out simulation for large scale objects made of glass/carbon fiber and polymer composites. Simulation of large scale objects (for example, road safety barriers) is done to predict material response and it allows economize as the experimental verification of material mechanical properties is mostly very expensive.

In this work the drop test simulation is done. In composite simulation material data are used from scientific articles and also experimentally determined. For experimental data collection glass fiber and unsaturated polyester composite was made. Better simulation results were achieved using experimental data. The correlation between experimental and simulation data are not perfect. Mainly, the absorbed energy results are lower than experimentally determined. Difference is about 15%.

For visual examination non-destructive ultrasonic imaging system was used. The area of rupture and delamination was compared between experimental and simulation data. The rupture region in experimental specimens is more uniform in in-plane direction than calculations of simulation LS-DYNA program show.