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Institute of Plasma Physics of the AS CR, v.v.i. – Regional Center for Special Optical and Optoelectronic Systems TOPTEC in Turnov (V. Léděl, Z. Melich) 231

Measurement of aspheric surfaces in optical production

(V. Léděl, P. Psota, J. Václavík, Z. Rail) 233
This article briefly surveys selected methods for measuring of optical surface shapes, especially aspherical surfaces, their advantages and parameters of devices applicable for this kind of measurement. Aspheres, in view of their great application potential, are currently in the focus of many scientific institutions and companies involved in optical manufacturing. The measurement possibilities of these devices are presented only roughly, their measuring range depends on the details of the specific application.

Tools for a zonal and corrective polishing of aspheric surfaces

(J. Václavík, V. Léděl) 237
Polishing of aspheric optical surfaces is done by different approach compared to traditional polishing of spheres and flats by full-aperture tools and methods. Zonal, sub-aperture methods of grinding polishing are used. These methods are meant not only for basic operations but also for deterministic form correction. Compared to full-aperture processing methods they require precise positioning of the tool and a stable and readily characterizable tool producing very smooth surface. Companies producing optical machines, developed wide range of sub-aperture processing tools and methods more or less fulfilling such requirements. Each method or tool has its strong and weak characteristics so it is necessary to consider actual application during choosing one. The article gives overview of methods used at present and their properties.

Keywords: zonal polishing, polishing tools, aspheric surfaces

Combination of birefringent materials for achromatic

waveplates (R. Melich) 242
In contrast to simple waveplates, achromatic waveplates provide almost constant path shift that is independent of the transmitted wavelength. This independency is achieved by usage of two different birefringent materials. The chromatic retardation shift of first waveplate part is compensated by a suitable material of the second waveplate part. The paper describes different types of waveplates and their path shift and considers a design of suitable pair of birefringent materials for achromatic waveplates. A flat retardation curve of achromatic waveplates is ideal for usage in tunable lasers, spectroscopy,

spectro-polarimetry and everywhere where is necessary to change the polarization of the broad band spectrum sources.

Keywords: waveplate, achromatic waveplate, birefringent material

SPDT Technology (R. Doleček, J. Václavík, V. Léděl) 245

The paper describes the single point diamond turning (SPDT) technology which represents possibility of ultraprecision machining with accuracy in fraction of wavelength in visible spectrum of light. The possibility of ultraprecision machining of different materials and freeform surfaces makes it demanded technology used for example in optical industry, where the technology serves for manufacturing of freeform metal mirrors, optical elements from plastic and some crystalline materials for infrared spectrum.

Keywords: SPDT, diamond tool, precision machining, optical surface

Radiators for testing of new detectors of Cherenkov radiation

(M. Šulc) 247
The Cherenkov radiators were developed for testing of new sensitive photon detectors - thick gaseous electron multipliers. The design of radiators was made by Zemax[®] software, where problems with simulation of source and propagation of Cherenkov radiation was solved. Spherical radiator focuses radiation to narrow ring, long radiator can produce large amount of photons. Radiators were produced and used in particle beam tests.

Keywords: Cherenkov radiation, radiator, optical simulation

Radiation transfer in arc plasmas (N. Bogatyreva, M. Bartlová,

V. Aubrecht) 251
Two different approximative methods (method of partial characteristics and method of net emission coefficient) were used for calculation of radiative properties of argon arc plasma in temperature interval 300 K – 30 000 K and for pressures 0.1 MPa – 1 MPa. The radiation flux density and its divergence were calculated under assumption of cylindrical arc and for simplified temperature profile.

Keywords: plasma radiation, partial characteristics, net emission coefficient

Specific quantities and mathematical relations of radar signal processing theory (J. Pospíšil, F. Pluháček) 253

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