

## Optical properties of crystals

Polarization of light. Polarization of general harmonic wave, polarization of planar waves. Description of the polarization by Jones vectors and matrices, Stokes description. Reflection and refraction, Fresnel equations, fundamentals of ellipsometry.

The principles of interferometric methods. Two-beam interference with division of amplitude: Michelson, Mach-Zehnder, Twyman-Green interferometer. Multi-beam interference, Fabry-Perot interferometer. Interferometry with wavefront division. Interferometer for measuring of small piezoelectric-induced displacements.

Holography.

Optics of anisotropic environment. Permittivity tensor, directions of polarization, optical Fresnel ellipsoid, uniaxial and biaxial crystals, birefringence, phase plates, the induced birefringence, photoelasticity.

Optical microscopy. Basic methods of microscopy, polarized light microscopy, compensators, conoscopic microscopy, measurement of the angle of the optical axis, digital image capture and evaluation in microscopy.

Electro-optical phenomena, Pockels and Kerr effects, phase modulators, rotators, measurement of Pockels and Kerr coefficients by using of interferometers and ellipsometry. Accurate measurement of birefringence. Measuring of electro-optic coefficients.

Magneto-optical phenomena, Faraday effect, magneto-optical Kerr effect

Optical activity and its measurement

Nonlinear optics, generation of the second and third harmonics, phase modulation

Acousto-optical crystals.

Crystals for laser resonators.

Literature:

HECHT E., ZAJAC A. ,Optics. Addison-Wesley Publishing Company, 1979.

SALEH, B. E. A., TEICH, M.C. Fundamentals of Photonics, John Wiley & Sons, 1991,

BASS MICHAEL Handbook of Optics. McGraw-Hill Inc., New York, 1995.

BORN M., WOLF E. Principles of Optics. Pergamon Press, Oxford, 1980.

Wood E, Crystals and light, Dover publication, New York 1977

Šulc M., chapter "Interferometer Based Methods for Research of Piezoelectric Materials" in book "Interferometry, Principles and Applications", Nova Publishers, ISBN: 978-1-61209-347-5