Nanoobjects microscopy

Digital holographic microinterferometry

H.A. Petrovska[1], V.M. Fitio[1], Y.V. Bobitski[1,2]

[1] Department of Photonics, Lviv Polytechnic National University,
12 Bandera Str., 79013 Lviv, Ukraine
Phone: 032-2582581, e-mail: galina_petrovska@mail.ru

[2] Institute of Technology, University of Rzeszyw, 35-959 Rzeszyw, Poland
Phone: 032-2582581, e-mail: bobitski@polynet.lviv.ua

Modern development of micro-and nanotechnology requires the development of new approaches and methods for the diagnosis properties of mediums and objects, and research processes and structural changes that are taking place under the influence of external factors. Optical microscopy is the classical method studying of the micro- and nanoscale mediums, phenomena and processes [1]. However, main disadvantages are limitation of the spatial resolution due to diffraction effects, and technical complexity 3D imaging of phase microscopic objects.

Indicated disadvantages will be disappeared when holographic interferometry and classical microscopy will be combined. This combination allows produce the qualitative and quantitative diagnosis with a high sensitivity and precision as well as achieving image magnification [2, 3].

In this work method of digital holographic interferometry to research the phase microobject are presented. Model of holographic interference microscope with a digital recording of holograms and receiving interferogram by subtracting two video signals has been developed. Technique investigation the distribution of refractive index in optical fibers has been developed. Experimental results of the distribution of the refractive index in the optical fiber are presented. It is shown that the sensitivity of the developed digital interference microscope depends on the characteristics of CCD and microscope zoom.

1. *Борн М., Вольф Э.* Основы оптики. – М.: Наука, 1973. – 719 с.
2. *Тишко Т.В., Титарь В.П., Тишко Д.Н.* Голографическая микроскопия. Трехмерная визуализация фазовых микрообъектов. // Прикладная радиоэлектроника. 2009. – Т. 8. – № 1. – С. 40-45.
3. *Inkyu M., Mehdi D., Arun A., Bahram J.* Cell Identification with Computational 3-D Holographic Microscopy. Optics & Photonics News, V. 22, № 6, June 2011, p.p. 18-23.