

Nanoobjects microscopy

Digital holographic focused image interferometer

H.A. Petrovska, Y.M. Kotsiuba, V.M. Fitio, N.S. Obukhovski, Ya.V. Bobitski

Photonics Department, Lviv Polytechnic National University. S.Bandera str., 12, Lviv-79000, Ukraine.

E-mail: halyna.a.petrovska@lpnu.ua

Well known that digital holographic interferometry (DHI) allows carrying out non-contact study of different objects and their properties with high resolution and accuracy. One of its main advantages is the possibility of using computer processing [1]. It makes possible to eliminate aberration, perform numerical focusing, adjust linear zoom, and increase the quality of digital interferogram. That all provides high quality interference studies with the ability to gain instant result and present it in user-friendly form.

In this work the digital holographic interferometer scheme with the software for digital interferogram recording and processing are presented. Among all optical schemes the most attractive is the scheme for focused image hologram recording [2]. In this scheme one can choose optical zoom value depending on the particular problem. For example, if an objective with a focal length of 150mm is used, linear zoom can be varied in range from 0.23 to 4.41. Thus the possibility of macro- and micro-region study can be realized. In addition, there are some scheme modifications for the study of transparent and non-transparent objects.

After digital hologram recording having been completed, interferogram is formed by the developed software [3]. In order to obtain high quality digital interferogram and visualize the result, following processing algorithms were added to our software: zero-order elimination, filtering in the frequency domain and phase unwrapping. The proposed new schematic and software solutions are suitable for the roughness of the object's surface study as well as for transparent object properties investigation.

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2. *Abramov A.Y., Savonin S.A., Dikov O.V., Perepelnitsina O.A., Ryabukho V.P.* Digital focused image holographic interferometry of microscopic transparent objects, // Collection of works of international conference «FOP-2010». Saint-Petersburg -2010. -1.-P. 272-274.
3. *H.A. Petrovska, Y.M. Kotsiuba, V.M. Fitio, Ya.V. Bobitski*, Optimization of the parameters of digital holographic microscope, 4-th International research and practice conference // Nanotechnology and Nanomaterials (NANO-2016) 24-27 August, 2016, Lviv