The abstract of PhD dissertation entitled:

The influence of the speckle and the quantization noise on the accuracy of determining the distribution of the interference field contrast

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The subject being investigated in the PhD dissertation is the influence of two types of noise: speckle and quantization, for the accuracy of determining the distribution of the contrast of the interference fringes in measuring pictures, obtained with the method of the fringe-contrast holographic interferometry. Here, determination of the distribution of the contrast is one of main stages of the conversion of measuring images into the distribution of a given quantity, e.g. displacement vector, deformation tensor, position vector of the surface shape, vibration amplitude, etc. Thanks to technological changes, that have taken place since the time the method has been proposed, at present it is possible to apply it in the measuring practice.

Investigations have been performed with the use of numerical experiments. The basic operating environment was the computational package *Mathematica 9.0*. As a test material, generated with a computer use, there have been applied interference pictures with fringes of variable contrast distribution and speckle noise as a stochastic process. Contrast distribution has been determined independently with three different methods based on: contrast definition, Fourier spectrum filtration, and phase shifting, with the previous speckle noise reduction applied independently with two methods: averaging on different realizations of speckle noise, and averaging of its single realization on a given area of its domain. In the dissertation, three criteria of the accuracy of the contrast determination have been chosen: absolute error, standard deviation of the error, and Pearson correlation coefficient.

The results presented in the thesis demonstrate, that present information technologies, as well as optoelectronic ones enable to implement the fringe-contrast holographic interferometry into the measuring practice within the domain of optical metrology. There is a possibility to determine the fringe contrast distribution with a small error. Quite unexpectedly, it turned out that the quantization of the light intensity in interference pictures with the use of small number of bits (3-4 bits per a pixel instead of standard 8-bit quantization) leads to a substantial decrease of the error.