**Topic: "Reducing the measurement error of micrometric displacements"**

**Significance of measurement error reduction**

Thermal imaging control of digital camera matrices for measuring microdisplacements is an effective method that allows detecting matrix defects with an accuracy of several micrometers. However, the accuracy of measurement results may be reduced due to measurement errors.

Measurement error can be caused by various factors, such as:

- Inaccuracy of the measuring device.

- Improper preparation for measurement.

- Incorrect measurement technique.

- Natural fluctuations of the measured value.

Reducing measurement errors is an important task, as the accuracy of measurement results depends on it. In the case of the method of thermal imaging control of digital camera matrices for measuring microdisplacements, the reduction of measurement errors is important for the following reasons:

- Microdisplacements of matrix elements are very small, so even a small measurement error can lead to a false conclusion about the presence of a defect.

- Defects in the matrix can lead to a decrease in image quality, which can have serious consequences for the use of the camera.

Therefore, it is important to use high-precision thermal imaging cameras and follow measurement technology to minimize measurement errors.

**Obtained measurement results**

In our research, we studied the influence of various factors on the accuracy of thermal imaging control of digital camera arrays for measuring microdisplacements.

We conducted experiments using different thermal imaging cameras, different methods of preparing matrices for control, different measurement methods and different measurement conditions.

As a result of our research, we obtained the following results:

- The accuracy of thermal imaging control of digital camera matrices depends on the accuracy of the thermal imaging camera. Thermal imaging cameras with higher accuracy allow you to get more accurate measurement results.

- The preparation of the matrix for control also affects the accuracy of the measurement. Matrices that have been cleaned of dust and dirt and on which uniform temperature distribution is ensured, allow to obtain more accurate measurement results.

- The measurement technique is also important for the accuracy of the measurement. The use of special methods of thermal image processing allows obtaining more accurate measurement results.

- Natural temperature fluctuations can also affect the accuracy of the measurement. Conducting thermal imaging control of matrices under conditions of stable temperature conditions allows to reduce the influence of natural temperature fluctuations on measurement accuracy.

**Method of obtaining results**

We used the following method to obtain our results:

1. We chose matrices with defects that were known to us in advance.

2. We performed thermal imaging control of these matrices using different thermal imaging cameras, different methods of preparing matrices for control, different measurement methods and different conditions of measurement.

3. We compared the results of thermal imaging control with the actual values of microdisplacements of matrix elements.

Based on the obtained results, we drew conclusions about the influence of various factors on the accuracy of thermal imaging control of digital camera matrices.

**Conclusion:**

The main components that affect the measurement error of micrometric displacements appear in the work. It describes many different approaches to reducing the measurement error of micrometric displacements, which are based on different physical principles. A comparative analysis of various methods of reducing the error of measuring micrometric displacements allows us to use the advantages and disadvantages.

The results of the study showed that the use of high-quality sensors with a low error of their own measurements can lead to a reduction in the measurement error of micrometric displacements.

• Use of methods of stabilization and compensation of external influences, such as temperature fluctuations, vibration and magnetic field.

• Increasing the accuracy of measurements using signal processing methods

Depending on the measurement conditions, different reduction strategies can be applied. For example, sensors with a low temperature ratio can be used to measure micrometric displacements under high temperature. Micrometric movements can be measured using stabilization methods that compensate for the effects of vibrations. The results of the work can be used to improve the accuracy of measuring micrometric movements in various fields of science and technology.