

The Information-Measuring System for Space Technology Monitoring

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Abstract. The purpose of the research was to validate the choice of fiber-optic measuring instruments for space technology. It is shown that the information-measuring system meets the requirements of the system being operated in the special conditions of rocket and space engineering and of the objects of the ground space infrastructure. In addition, the task was to research the fiber-optic information-measuring system to determine the metrological characteristics and further evaluation of the system efficiency.

The developed information-measuring system includes a fiber-optic strain and temperature sensors.

The sensing tip of the fiber forms fiber bragg gratings (FBG). The temperature and strain readings are obtained by measuring the shift of the resonance FBG wavelength by the built-in spectrum analyzer. The results of the study showed that the sensitivity of the FBG was 11,2 pm/°C for the positive range (from 25 to 300 °C) and 9,1 pm/°C — for the negative temperature range (from –80 to 25 °C). The deformation ratio of FBG in the range up to 1200 $\mu\epsilon$ (0,012 ϵ) was $K = 0,6 \pm 0,3 [1/\mu\epsilon]$. The comparison of the calculated and experimental data showed minor discrepancy between the predicted and experimental values, which confirms the correctness of the constructive decision and system efficiency of the developed information-measurement system.

Keywords: fiber Bragg grating, information-measuring system for monitoring, measuring cell, sensitivity