DIGITAL ROTATING MIRROR CAMERA BASED ON DIRECT RECORDING ONTO A SEQUENCE OF CMOS SENSORS

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Rotating mirror cameras remaining to be an essential instrument for investigation of high-speed gas-dynamic processes. They are used in measurement techniques and in many research tasks [1]. When conducting research, it is essential to obtain new additional information, for which it is necessary to improve measurement tools. Therefore, it is important to improve rotating mirror cameras in terms of increasing temporal and spatial resolution, improving measurement accuracy, increasing the maximum registration duration, as well as improving synchronization accuracy with the research process.

For this purpose a digital rotating mirror camera has been developed, featuring direct recording onto a sequence of CMOS sensors. To eliminate the gap between sensors, a mirror is installed at an angle of 45 degrees, which transmits the image to a perpendicularly mounted sensor.

A distinctive feature of this scheme is that the sensors are plain, and the scanning speed will be non-uniform in the center and at the edge. Additionally, manual positioning leads to a tilt of the sensors relative to each other, which also results in non-uniform scanning, and collectively, this leads to significant measurement errors.

This paper presents a technique for calibrating and combining images into a unified panoramic image. The results show that it is possible to obtain a continuous digital photogram with a length more then 150 mm, achieving a temporal resolution of at least 5 nanoseconds, while maintaining an error in time interval measurements of no more than 15 nanoseconds.

References

1. **Andrianov, V. P.** Digital photochronographic recorder for the study of fast processes [Text] / V. P. Andrianov, Yu. B. Bazrov, V. N. Turkyn // Physic of Combustion and Explosion. – 2018. – Vol. 54, No. 5. – P. 112–121. – doi: 10.15372/FGV20180616.