On the selection of the digital filter at the laser gyrometer output in the mode of measuring small constant angular velocity

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The paper describes investigations of a possibility to increase the accuracy of laser gyrometer operating in the mode of measuring small constant angular velocity. The accuracy is increased by noise suppression at the output using various digital filters in the case when the noise amplitude is by several orders higher than measured signal. Noise at the output of laser gyro can be caused by the internal factors: e.g. dither noise, discrete output of pulse-phase detector (PPD), etc., and external reasons, such as vibrating disturbance. Modeling such digital filters as Butterworth-IIR-Filter, Chebyshev II order IIR filter, Blackman-Nuttall-FIR-Filter and the filter based on robust selections of straight regression lines under conditions of vibrations has been performed. As a result of research it has been established, that at reasonable microprocessor resource intensity the filter based on robust selections of straight regression lines most effectively suppresses output noise which allows to measure low constant angular velocity with an acceptable accuracy for a variety of applications with intense vibrations of a base caused, e.g., by engine operation.

Keywords: *laser gyroscope, laser gyrometer, digital signal processing, digital filters, filter based on robust estimation.*

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