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SIGNAL NOISE REDUCTION BASED ON WAVELET TRANSFORM IN TWO-WAVELENGTH LIDAR SYSTEM

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Abstract. Nowadays lidar has become a leading edge technology for photogrammetry and remote sensing. A new lidar with two detection wavelengths was presented in this paper. The two-wavelength lidar can obtain spatial information and spectral information, and intensity of backscatter signals in two-wavelength can be availably used for objects identification and observation. However, the backscatter signals are weak and strongly influenced by the noise. In order to acquire accurate intensity, the signal noise has to be removed. As a useful tool for signal processing, wavelet transform was chosen. In this study, the principle of two-wavelength lidar was introduced and possible noise in the backscatter signal was analysed. Then the signal progressing was executed on the basic of wavelet de-noising. First, singular values caused by varieties of noise source have to be rejected from the signal based on three standard deviations. Second, combination of modulus maxima method and threshold method is used to make further improvement on the signal. Finally, an evaluation of the noise reduction was given to testify the ability of the method. The results show that the effect of the method based on wavelet transform is better than other classical algorithms, and the method is suitable for signal noise reduction in two-wavelength lidar system.

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