

Ultrasound Detection of Explosives Using Wavelets for Synthesis of Features

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In the present paper, we propose a method of classifying Ammonite_ZH-B-E, Ammonite_E, and Trotyl by noncontact ultrasound acquisition of information. The received signals are processed using orthogonal wavelet basis functions of Haar (Daubechies 1), Daubechies, Coiflets, and Symlet. The application of this method in automatic classification systems is studied, focusing on the part concerned with the formation of feature complexes for assigning an explosive to a predefined class. By using discrete wavelet transforms (DWTs) with the above-mentioned orthogonal wavelets, the feature spaces of classifiers have been formed, which operate with a decision rule following the k-nearest neighbor (KNN) method. By using the classifiers thus synthesized, a test sample has been classified, and a very good result (overall precision, 98%) was obtained when applying the Haar wavelet (Daubechies 1).

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