57. Study for the Sonar Target Pattern Recognition Based on the Acoustic Scattering Features

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The objects of active sonar are to detect targets and further to acquire their information such as target specification, dimension, motion and state, after processing their echoes. Especially, classification and discrimination of target using active sonar need to utilize the advanced analysis of target echo features.

Specular reflection and scattering from surface irregularities and inner structures contribute to the target echoes. Since contributors of echoes vary with the target kind and target aspect angle, they constitute basic features of the target signal. Feature parameters of the experimental target signal were extracted in three ways which are the envelope in time domain, the time separation pitch in frequency domain, and the short time Fourier transform in time-frequency domain. The extracted features were applied to the pattern recognition techniques to classify and discriminate target.

Classifying and discriminating similarly shaped targets of which dominant component of the echo is specular reflection result in poor assortment and identification. However, the results show better performance when the effect of inner structures appears in target echoes at the specific aspect angle.