

Analysis Of Non-uniform Characteristics Of Small Underwater Targets Based On Clustering

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Abstract : Small underwater targets generally have a non-centrosymmetric geometry, and the acoustic scattering field of the target has spatial inhomogeneity under active sonar detection conditions. In view of the above problems, this paper takes the hemispherical cylindrical shell as the research object, and considers the angle continuity implied in the echo characteristics, and proposes a cluster-driven research method for the non-uniform characteristics of target echo angle. First, the target echo features are extracted, and feature vectors are constructed. Secondly, the t-SNE algorithm is used to improve the internal connection of the feature vector in the low-dimensional feature space and to construct the visual feature space. Finally, the implicit angular relationship between echo features is extracted under unsupervised condition by cluster analysis. The reconstruction results of the local geometric structure of the target corresponding to different categories show that the method can effectively divide the angle interval of the local structure of the target according to the natural acoustic scattering characteristics of the target.

Keywords : underwater target, non-uniform characteristics, cluster-driven method, acoustic scattering characteristics

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