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Two-dimensional investigation of the effects of three materials and regular geometry of seabed on low frequency sound propagation in marine environment

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Abstract

Low frequency underwater sound propagation is one of the most important topics of research in recent years. This can be attributed to the noise generated by underwater and surface vessels. To better understand the behavior of the underwater sound, different factors affecting sound must be investigated. In the current study, numerical analysis of the effects of regular geometry and three materials of seabed on sound propagation is conducted. To this end, parabolic equation governing the sound wave propagation is solved using implicit finite difference scheme. The obtained results indicate that transmission loss (TL) of the granite bottom with triangular and semicircular geometries is reduced by an increase in distance. However, TL gradually increases in the case of rectangular geometry. Values of transmission loss of the sandstone bottom are increased by an increase in the range for the mentioned geometries. However, average value of TL for the semicircular geometry is about 4 decibels less than the other two geometries. On the other hand, rigid, sandstone, and granite seabed have no significant influence on the graph of TL for the rectangular geometry at 30m depth.

Keywords: Underwater sound propagation, Low frequency, Geometry of bottom, Material of bottom, Parabolic equation.

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