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# (Technical Note)
# Sound waves propagation with different frequencies in the Persian Gulf

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## Abstract

The propagation of sound waves in shallow water is complex and unknown due to the special conditions of the surface and bed of water bodies. In recent years, the use of a wide range of application software to recognize this effect on the propagation of sound waves to improve the performance of sonar systems has increased. In shallow water and coastal areas, the interference caused by surface and seabed reflections is very important and effective. Several methods have been developed to model the propagation of sound waves. In the present research, the method of parabolic equations by considering the frequencies of 500, 1000 and 10000 Hz for the transmitter has been used to model the propagation of sound waves in the Persian Gulf. The results showed that the effects of the seabed are the main factor attenuating the energy of sound waves. Also, the highest penetration of sound waves in the bed layers occurred at frequencies lower than 1 kHz. The interaction of sound beams with the seabed is also increased, with increasing the depth of the transmitter and as a result more loss in the transmission path is recorded.

**Keywords:** Sound waves propagation, Parabolic equations, Seabed loss, Actup model, Persian Gulf.

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