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**High-frequency underwater acoustic propagation in a port using  
the three-dimensional method of images**

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A computer-efficient model for underwater acoustic propagation in a shallow, three-dimensional rectangular duct closed at one end has been developed using the method of images. The duct simulates a turning basin located in a port, surrounded with concrete walls and filled with sea water. The channel bottom is composed of silt. The modeled impulse response is compared with the impulse response measured between 15 kHz and 33 kHz. Despite small sensor-position inaccuracies and an approximated duct geometry, the impulse response can be modeled with a relative echo magnitude error of 1.62 dB at worst, and a relative echo location error varying between 0% and 4% when averaged across multiple measurements and sensor locations. This is a sufficient level of accuracy for the simulation of an acoustic communication system operating in the same frequency band and in shallow waters, as time fluctuations in echo magnitude commonly reach 10 dB in this type of environment.