

RESULTS OF EXPERIMENTAL STUDIES OF HYDRO-ACOUSTIC CHARACTERISTICS
OF A DIGITAL COMMUNICATION CHANNEL IN THE SHALLOW WATERS WITH THE
ICE COVERING

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ABSTRACT

Offshore marine zones are usually covered with ice for a long period of time thus causing temporal and spatial variation of acoustic velocity field and acoustic noise. The efficiency of data transmission underwater acoustic devices operation in such conditions is estimated according to hydrological-acoustical environmental characteristics acquired in the course of sea tests. To conduct such investigation a special design bureau has provided a testing site at Tunaycha Lake (Island of Sakhalin, Russia), and in winter period acoustic velocity vertical profile is measured directly there. To study the underwater acoustic communication channel properties we use underwater digital acoustic modem of S2CR type (EvoLogics Company product, Germany). During winter 2013 tests we repeatedly transferred packet data of different size including image files, real-time NMEA data and performed video communication transmitting video signals through water environment. The sea tests and simulation experiments resulted in values of the main properties of the investigated acoustic communication channel. Particularly, measuring the acoustic velocity field allowed to reveal the effect of vertical convection (upwelling) of water in the investigated offshore zone. The applied waveguide model taking into account multipath acoustic propagation and medium inhomogeneity makes it possible to solve more underwater acoustic investigation tasks. The underwater acoustic communication channel capacity is enough for enhancement of autonomous geocologic monitoring devices on the basis of underwater space-distributed informational-measuring systems.

Key words: digital underwater acoustic communication channel, ice cover, shallow offshore zone, acoustic channel properties, data message.

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