9. Study of the Capacity of Breakwater with Channel to Exchange Water

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Deterioration of water quality becomes severe problems in some harbors because the circulation of water in the enclosed region by breakwaters is weakened and exchange of water becomes inactive there. Submerged breakwaters and floating breakwaters have an advantage over the impermeable breakwaters in that they can more easily exchange water. However, they are not effective to maintain harbor tranquility.

The aim of this study is to investigate the flow rate through the breakwater with channel and the capacity of the breakwater to exchange water under various flow conditions. The breakwaters with slope channel and step channel effectively reduce transmitted wave height when compared with a straight channel, and the flow rate through the breakwater with channel can be estimated from the non-linear Darcy's law. The time required to change whole water in the harbor can be estimated from the water volume in the harbor, the representative wave-induced current velocity around the harbor, and the opening ratio of the channel in the breakwater. And the author examined the ability of the breakwater with channel to exchange water using wave in a wave flume. In the model, flow rate through the channel is evaluated using lateral overflow model.

Key words: Exchange of water, Breakwater with channel, non-linear Darcy's law, Exchange of water using wave