

EXPERIMENTAL STUDY ON DEVELOPMENT OF LONG-SPAN FLAP-GATE TYPE SEAWALL FOR TSUNAMI AND STORM SURGE

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NEORISE SYSTEM

A flap-gate type movable seawall, which usually lies down on the ground, rises up automatically by buoyancy during inundation by tsunamis or storm surges, and then it forms a continuous seawall. This structure keeps lying in usual time to secure traffic and landscape. In emergence time, it protects a target area against inundation without power machineries and human operation. It is named NEORISE which means No Energy and no Operation Rising SEawall, as shown in Figure.1.(Kimura 2014) The NEORISE system is equipped with counterweights hung by wire ropes connected with pins set on both sides of the top of a gate, inserting grooves of side-walls installed on both sides of the gate, through a pulley, and the counterweights assist the gate in rising and standing.(Kimura 2015) The counterweight reaches the lowest location in the middle of the gate's motion from the lying state to the standing state, and it works as an offsets to weight of the lying gate and as a brake for the moving gate just before standing.

LONG-SPAN TYPE NEORISE SYSTEM

However, it is complicated to design cross direction members of the widened NEORISE system economically since a supporting interval by wire ropes connecting each counterweight extends according to an increase of the gate width. In order to realize the economical design, a long-span type NEORISE system, which can prevent the supporting interval from widening by setting the counterweight behind the gate, has been developed, as shown in Figure.2.(Hirano 2016) The counterweight which is set behind the gate has to be installed under the land surface in order to keep level around this system and it has to lift and drop within underground space. Although digging holes for the counterweights underground may be expensive, it is effective to apply the long-span type NEORISE system to raising an embankment by utilizing unused space just behind the previous structure.

HYDRAULIC EXPERIMENTS

In this study, motions of both gates and counterweights and wave force acting on gates were examined through a series of hydraulic experiments using a model of the long-span type NEORISE system. As a result, wave force acting on the gates was within ranges in which the NEORISE system can be designed reasonably. The experimental works confirmed that the long-span type NEORISE system has good performance for protecting target areas against tsunamis or storm surges.

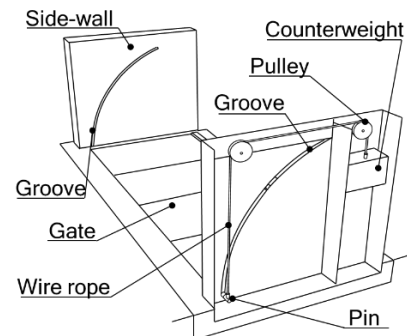


Figure 1 - Equipment for NEORISE system.

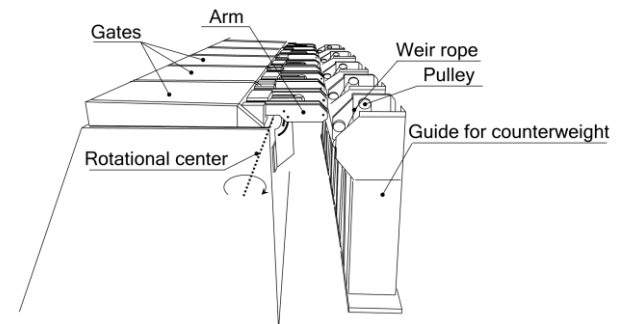


Figure 2 - Equipment for long-span type NEORISE system.

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