

Research Trends and Results

Precautions for Artificial Reef

- Not evaluated only by wave-absorbing performance -

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1. Artificial reef with difficulty in estimating the effect of coastal erosion control measures

Artificial reef is a structure for breaking waves by shoaling and reducing wave height on the shore side. There are some successful cases of constructing an artificial reef keeping moderate coastline and off-coast view. However, there are also cases of failure to form a shoreline as contemplated, so artificial reef is actually a coastal structure that is difficult to plan or design.

The NILIM has been conducting researches and studies for appropriate planning and design of artificial reefs.

2. "On-shore current" formed by forced wave breaking and its flow regime

Waves broken on the artificial reef cause "on-shore current," which flows toward the shore and causes a sharp retreat to the shoreline.

Figure 2 shows the flow regime patterns for surface and bottom layers obtained by the experiment of changing the crown height and offshore distance as shown in Figure 1. When the surface layer type c, where the flow from the artificial reef hits the coastline, is combined with the bottom layer type C, it is particularly dangerous.

3. Importance of flow regime patterns

Performance of artificial reef is often evaluated with the wave height transmission rate, which represents the wave absorbing effect on the shore side of the artificial reef. The location of artificial reef may be shifted to the shore side from the ideal off-coast location due to social constraints. As shown in Figure 3, however, when the crown is raised and water depth is reduced, the wave height transmission rate will fall but the flow regime pattern will shift to a regime where onshore current hits the shoreline, which is not favorable for shoreline conservation. Evaluation of only wave absorbing effect may lead to shoreline retreat and result in adverse effect.

4. Policy to address strong on-shore current

"Policy to address the move of artificial reef to the shore"¹⁾ is to "study for devising the shape to let water into the opening on the crown and reduce on-shore current." There are previous studies²⁾ and examples concerning this policy available as reference.

☞ See the following for details.

1) Civil Engineering Journal, vol.58, No.2 pp. 42-45, 2016
2) Figure 4 in the collection of coastal engineering papers, vol. 51, pp.606-610, 2004

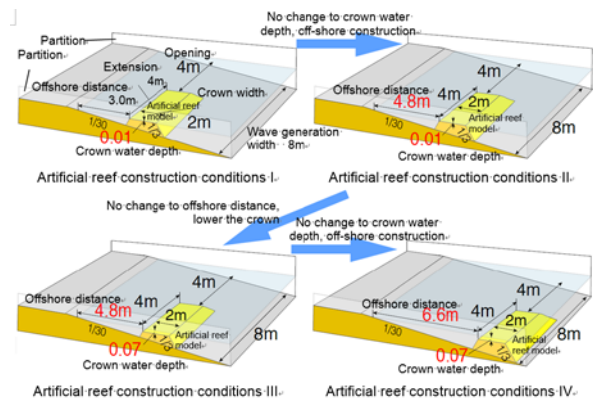


Figure 1: Installation conditions experimented

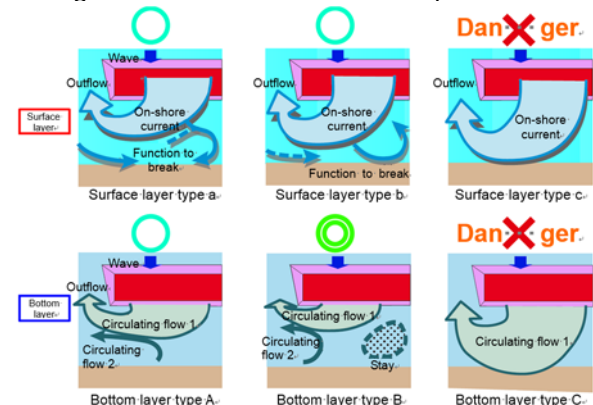


Figure 2: Flow regime types obtained by experiment

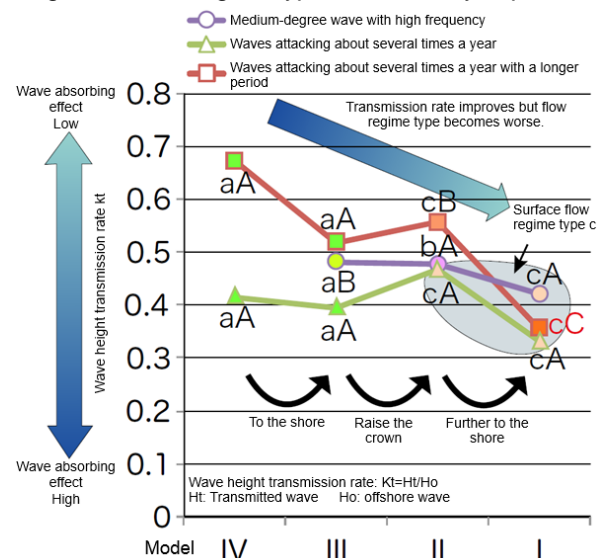


Figure 3 Wave height transmission rate and flow regime type according to construction conditions