Study on Selection for Zostera marina Beds
Using Numerical Model

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ABSTRACT

Recently, fishery products have been decreased in the Seto Inland Sea located at the western part of Japan. One of these reasons is decrease of seagrass and seaweed beds such as Zostera marina, Sargassum and so on. The valuable marine resources are using Zostera marina beds as spawning and nursery grounds. In this study, the authors reproduced the flow field around the Zostera marina bed behind the detached breakwater using three-dimensional hydrodynamical model. Then we examined the appropriate area of Zostera marina beds and new construction method of detached breakwaters for preservation of seagrass and seaweed beds.

KEY WORDS: Seagrass; seaweed; Zostera marina; three-dimensional hydrodynamical model; detached breakwater.

INTRODUCTION

In the Seto Inland Sea, Zostera marina (Fig.1) beds have been reduced by sand mining to use for concrete material and coastal development (Moriguchi, Shimatani and Terawaki, 2006). Fig 2 shows the temporary change of Zostera beds area in Kagawa prefecture. The Zostera beds have decreased 90 percent in 50 years. A number of seagrass beds including Zostera beds have been developed in Kagawa Prefecture since 1997. However, it is difficult to enroot Zostera beds due to various reasons including fast current and appropriate method for development is required.

Therefore, we simulated the transfer mechanism of Zostera seeds using three-dimensional hydrodynamical model in order to determine the range of Zostera marina habitat. The model is taking Euler-Lagrangian method and sinking velocity of Zostera seeds that we measured by water column experiment. We also simulated the seeds migration using new model that we changed shape of detached breakwater. Then we proposed the new construction method of detached breakwaters and appropriate area for Zostera marina habitat.

Fig. 1 The Zostera marina specimen and Zostera bed

Fig. 2 Temporary change of Zostera beds area in Kagawa prefecture