

# **CONSIDERATION OF EFFECT OF CAISSON TILTING FOR IMPROVED EVALUATION OF SLIDING STABILITY OF A CAISSON**

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## **1. Introduction**

In the reliability design method (level III) of caisson-type breakwaters, the sliding distance of a caisson is computed for evaluation of sliding stability. Authors (2003) presented a formulation for computation of sliding distance. According to recent laboratory experiments (Kim et al., 2004), however, there is a significant difference in the sliding distance between the formulation and experiments. Therefore, the present work is focused on the improvement of computational method to the introduction of the tilting effect on the sliding distance.

## **2. Modification of existing time-history model on wave force**

The time-history model on wave force, which is proposed by Tanimoto et al. (1996), has been used in the computation of sliding distance up to now. However, the existing model over-estimates significantly the wave force of standing wave part in the horizontal wave force and uplift pressure, even though the wave forces of impulsive wave part make a good agreement with values measured by experiments. Therefore, the existing model is modified by employing a decrease coefficient for proper estimation of wave force acting on the caisson under wave impacts.

## **3. Consideration of effect of caisson tilting into evaluation of sliding distance**

In the present work, a proposal is presented for consideration of effect of caisson tilting into evaluation of sliding distance based on laboratory experiments. The resistance force due to caisson tilting is defined, and introduced into computation of sliding distance. By considering the decrease coefficient and tilting resistance force, the evaluation of sliding stability can be improved significantly.

## **References**

- [1] Kim, T.M. and T. Takayama (2003). Computational improvement for expected sliding distance of a caisson-type breakwater by introduction of a doubly-truncated normal distribution, *Coastal Eng. J*, **45**, 3, pp.387-419.
- [2] Kim, T.M, Takayama, T and Y. Miyawaki (2004). Laboratory experiments on the sliding distance and tilting angle of a caisson breakwater subject to wave impacts, 29<sup>th</sup> International Conference on Coastal Engineering, ASCE, Lisbon (accepted).