

# A Wave Tank Model for Coastal Flood Defence

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**Abstract-** A water tank model to study the behavior of waves and their impact on coastal areas. Artificial waves are generated in the tank to simulate sea waves and flood and a sloping bed and coastal defence structures (such as seawalls, steps, rock amorus, re-curve wall) are modeled.

The experiment helps in understanding wave propagation, and the effectiveness of coastal protection measures. Such physical modeling is useful for designing safe and efficient coastal defence structures, reducing flood risk, and protecting coastal regions from and natural disasters

**Keywords:** coastal areas, wave propagation, as seawalls, steps, rock amorus, re-curve wall, defencemould, transparent water tank, battery with motor, sea wall.

## I. INTRODUCTION

The tank wave were going to demonstrate the different defenses that we can uses were going to propagate five waves towards each of the defenses and we're going to calculate how much waves are going to over top the defenses we're going to capture this were going to measure it we're going to see the performance levels of all of the different structures right now our first situation we're going to represent is our beach environment now normally when waves arrive at a beach they're going to break and they're going to roll up and down the beach face and there's going to be any problem noe today though we're going to've filled up the tank a little bit more we're representing a storm surge now this means that there's deeper water bigger waves are going to be arriving at our coast and they've got the ability to roll up and down the beach but they can also go over the junes and inundate all the communities behind.

**AIM** :- To Analysis Wave Behavior For Coastal Flood Control .

### OBJECTIVE :-

- To control over topping of to water
- To protect industry, community, human from flood.
- To analysis the effect of various defence structure [ seawall, steps, rock amrous]

- To demonstrate how overtopping occurs in coastal are deu to waves.

## II. LITERTURE REVIEW

NehilAgarwal\*1, PranayLal\*2 “COASTAL EROSION – A DEMONSTRATION USING WORKING WAVE TANK.”A coast is the area where Land meets the sea. It is one of the most dynamic areas in the world of extreme fragility. The relentless crashing of water through waves, exerts pressure and breaks up soil particles. Waves can also take sand and sediment which gets bashed against the rocks, grinding, scrapping, and chipping them over time. This process is known as Coastal Erosion. The sand found on our beaches is being subjected to this erosion since the formation of these oceans, however in recent years there has been a sand deficit, making our beaches vulnerable to coastal storms and posing threat to the human settlements. Presently the most prevalent answer to Coastal Erosion is to sacrifice the land and retreat. However, the defending strategies for mitigating coastal erosion can be broadly categorized into two main types, Hard Structure Construction and Soft Structure Construction with the effectiveness of these measures depending on a range of factors. Hence our project studies the Causes and Impact, demonstrated with the help of a working model stating its construction, procedure, and observation

Wouter Jan Klerk b , Vera van Bergeijk b , WimKanning b , RogierWolfert a , MatthijsKokRisk-based maintenance and inspection of riverine flood defence system. “The condition of flood defence revetments is influenced by many different degradation processes such as animal burrowing, rutting and growth of weeds. Many of these processes are shock-based rather than progressive continuous. As shocks can cause a drop in performance, this means that the condition of a revetment can suddenly decrease, meaning that revetments can have significant initial damage at the beginning of a storm. Combined with the limited detection probability of common visual inspections of flood defences, this can have a significant influence on the reliability of flood defence systems, something typically not considered in reliability analysis. In this paper we study the reliability of a flood defence system subject to shock-based degradation. Various maintenance concepts are compared for a case study of a riverine flood defence of 20 kilometres length. This

demonstrates that the current maintenance concept is insufficient to satisfy the reliability requirements for failure of the revetment. Overall, the joint influence of degradation and the existing maintenance concept leads to a 20 times higher failure probability estimate compared to a typical assessment without these aspects. Next, we demonstrate that both additional inspections, and targeted interventions to reduce the impact of for instance animal burrowing, can significantly reduce total cost and improve robustness of the considered flood defence system

Pedro Fornaro, Jacopo Ramello, Facundo Mosquera, Giuseppe Giorgi, John Ringwood. Tiny-T: A small-scale demonstration tank for real-time wave energy control. “This article presents a detailed description, and step-by-step process, required to build a small-scale wave energy tank demonstrator (Tiny-T). The system consists of an operative wave energy converter (WEC) with active control, representing the first demonstration of electronic WEC control at 1/100 scale. A key feature of Tiny-T is that the full demonstration system costs below €600. This document provides complete details on the materials, construction, and testing of the system, as well as aspects related to the appeal of the demonstration. As an experimental platform, Tiny-T represents a valuable resource for introductory research inquiries, catering to both high school and university-level studies. Overall, Tiny-T accessibility opens doors for a broader audience to engage with the promising potential of wave energy and real-time control technologies”

**III. METHODOLOGY**

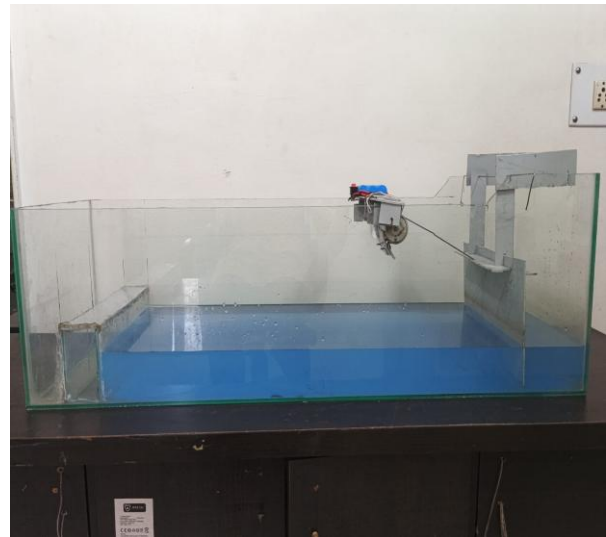
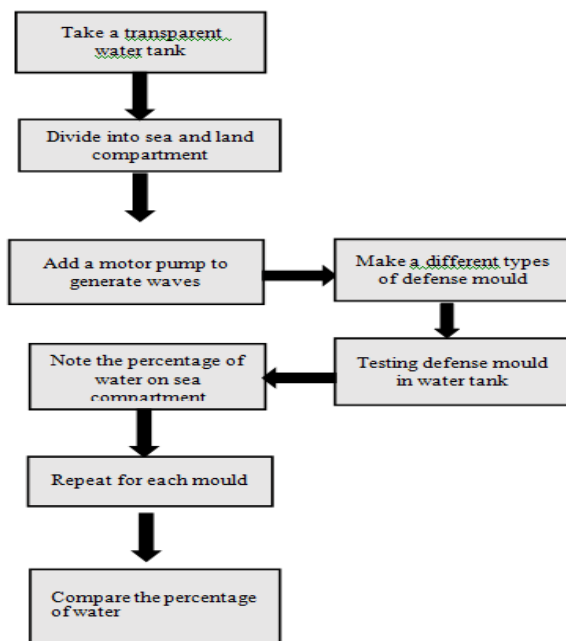


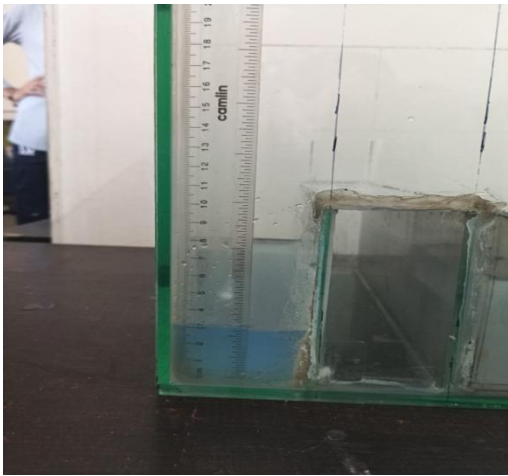
Fig :- Fig :- Transparent wave tank

**IV. RESLUT AND DISCUSSION**

Types of defence	Water topping in cm	Water topping in cm <sup>3</sup>
Slope Revetment	3 cm	486.756 cm <sup>3</sup>
Beach Environment	1.6 cm	259.6 cm <sup>3</sup>
Steps	0.5 cm	81.725 cm <sup>3</sup>
Rock Amrous	0.4 cm	64 cm <sup>3</sup>
Submerged Brake Order	0 cm	0 cm <sup>3</sup>

1. Slope Revetment





By using slope revetment there is 3cm of water topping.



By using the step defence there is less over topping of water is 0.5cm

2. Beach environment

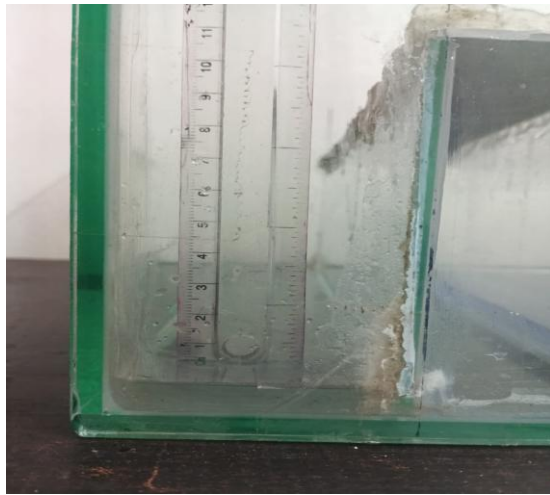


By using beach environment there is 1.6cm water over topping

4. Rock amrous

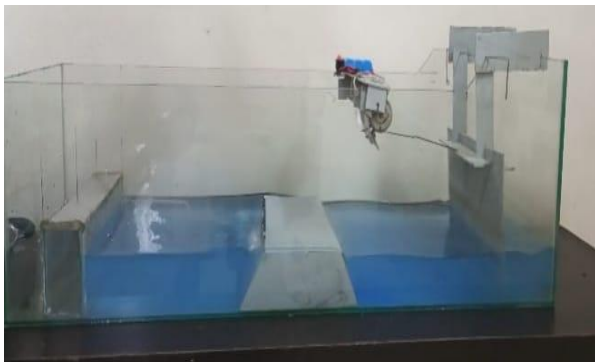


3. Step Defence



By using rock armour there is also less over topping of water it's 0.4cm

#### 5. Submerged brake order



By using submerged brake order there is no over topping completely zero over topping.

#### V. CONCLUSION

After testing the all different types of structure we observe that by using submerged **brake order structure** at the center of the tank we, can completely stop the water over topping and can save or provide safety to the community. .

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