

## **The Study of In-Situ Pore Pressure Monitoring of Seabed Soil Under Wave Loading**

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### **ABSTRACT**

In this study, the field monitoring of the pore water pressure of the seabed soil under the wave action is investigated. From the coastal geotechnical engineering viewpoint, the wave-induced pore water pressure of seabed under irregular wave action and wave height in-situ were discussed, and also comparison with the laboratory simulation test to understand the relationship properties. The monitoring of pore water pressure system is jointed with the run-up of wave monitoring pile system in Golden Coast of Tai-Nan. In order to obtain the profile of various pressures induced by wave loading, the monitoring depth set up from -0.5m to -3.5m in step of 1m below seabed. Concerning above the monitoring of wave induced the pore water pressure within the seabed, the results of calculation of Yamamoto wave theory and the cyclic triaxial tests in laboratory could indicate that by using of the wave theory formulae derived under limitless depth seabed and pore water completely saturation, to evaluate the seabed of dynamic pore water pressure after the wave through the break zone. It found that the dynamic pore pressure induced by wave loading is underestimated tendency. But the decay curve of  $\Delta u_{\text{field}} / P$  compared with the monitoring data and theory calculation have same tendency. The ratio of  $\Delta u_{\text{field}} / P$  is decreased as depth dimensionless of  $z/L$  increasing. The monitoring results and analysis could be provided to the reference of the related seabed stability and coastal prevention disaster.

**KEY WORDS:** Field monitoring, pore water pressure, seabed soil, wave loading.

### **INTRODUCTION**

Due to the sandy coast of Taiwan often hit by typhoon waves loading, usually inducing the instability or failure of the sea bed, and could cause the damage of the coastal and artificial structure in near shore area. According to related researcher indicated that the wave induces

the dynamic stress within the sea bed to be often considered as the main reason causing the sea bed unstable. The mechanism of wave-induced seabed instability can be classified into two major types: shear failure and liquefaction, which are the major causes of the failure of coastal structures.

In order to understand the wave in-situ induced the pore water pressure of the sea bed soil under wave loading, this research selects in Gold Coast of Tainan, western coast of Taiwan as studying area. The main purpose of this research includes: to understand in-situ wave water level variable situation with pore water pressure, to simulate wave factor perform on laboratory using the cyclic triaxial tests, and try to obtain pore water pressure exciting state by progressive wave-induced. Finally, comparing with analyze the difference between monitoring value, theoretical approaches and cyclic triaxial tests results under wave loading in-situ.

### **THE STUDY METHOD AND TEST SYSTEM**

#### **Study Method**

The research approach in this study includes: (1) Select the suitable nearshore area for monitoring, and collect its wave characteristic, and properties of seabed soil. (2) Collect relevant studies about the progressive waves-induced dynamic stresses within the natural deposit seabed around the nearshore coast. (3) Use zero-up-cross method to calculate the wave height and period in irregular wave. (4) Based on the investigation and analysis data, a series of cyclic triaxial test were performed to simulate in-situ wave condition in the laboratory. (5) Comparing with the monitoring data, experimental results, and the theoretical analysis to understand the suitability of the theory.

#### **Test System**

##### ***The embedded depth of pore water pressure transducer***

The pore water pressure of pile monitoring system were adopted eight sets sensors with the strain gauge type. The progressive wave-induced dynamic stress within the seabed from the top water level varies which