

沉箱基礎設計規範之評析與側向阻抗之簡化分析模式

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摘 要

本文回顧日本之沉箱設計規範，檢討評析常用分析模式之合理性，繼則探討沉箱之側向阻抗問題，以理論模式分析沉箱周邊土壤對沉箱彎矩阻抗之貢獻，顯示可將沉箱之分析模式近似簡化為僅考慮沉箱周邊土壤之水平反力，此簡化模型之力學分析變得相當簡單，可直接推導得在彈性土壤與完全彈塑性土壤中沉箱側向反應之解析解，方便於工程初步分析時計算使用。

關鍵字：沉箱基礎、設計規範、側向阻抗、簡化分析模式。

Review for Design Specifications of Caisson Foundations and the Simplified Model for Lateral Response Analysis

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Abstract

The commonly used design specifications of caisson foundation were reviewed in this paper. The model that simulates lateral resistance of a caisson foundation contributed from various soil springs connected to the caisson was investigated analytically and numerically. Results showed that the resistance comes majorly from the horizontal subgrade reactions in front/back of the caisson. Based on that, modeling for the lateral response of a caisson can be approximately simplified to only considering the horizontal soil reactions surrounding the caisson, which makes the mechanis analysis much easier. This simplified model can then be utilized to directly implement the analytical solutions of the lateral response of a rigid caisson embedded in the elastic soils and in the perfectly elasto-plastic soils, which are useful for preliminary analysis in engineering practice.

Key Words : caisson foundation, design specifications, lateral response, simplified model.

一、前 言

沉箱基礎、井式基礎與連續壁基礎均屬深基礎型式之一，其名稱源自於施工方式，三者施工方式完全不同，但在設計分析上卻使用類似之分析模式，故本次地工技術規劃將此三種基礎之設計與施工編成一專輯，作為工程應用之參考。

沉箱基礎、井式基礎與連續壁基礎之示意圖如圖一所示，其中沉箱基礎係以預鑄或場鑄之基礎結構下沉於基礎土壤中或岩盤面上，適合於水面下或地下水位很高之場地施工，故以往大多用於過河橋梁之基礎工程，亦有於陸上施作者(如中彰外環道路)；井式基礎是指以井式開挖基礎深坑後構築基礎結構，故井式開挖為最主要的設計考慮事項，僅適用於陸上地下水水位低且相對堅實的地盤，國內常用於輸電電