

離岸風機水下基礎設計暨決策資料庫與展示平台

執行單位

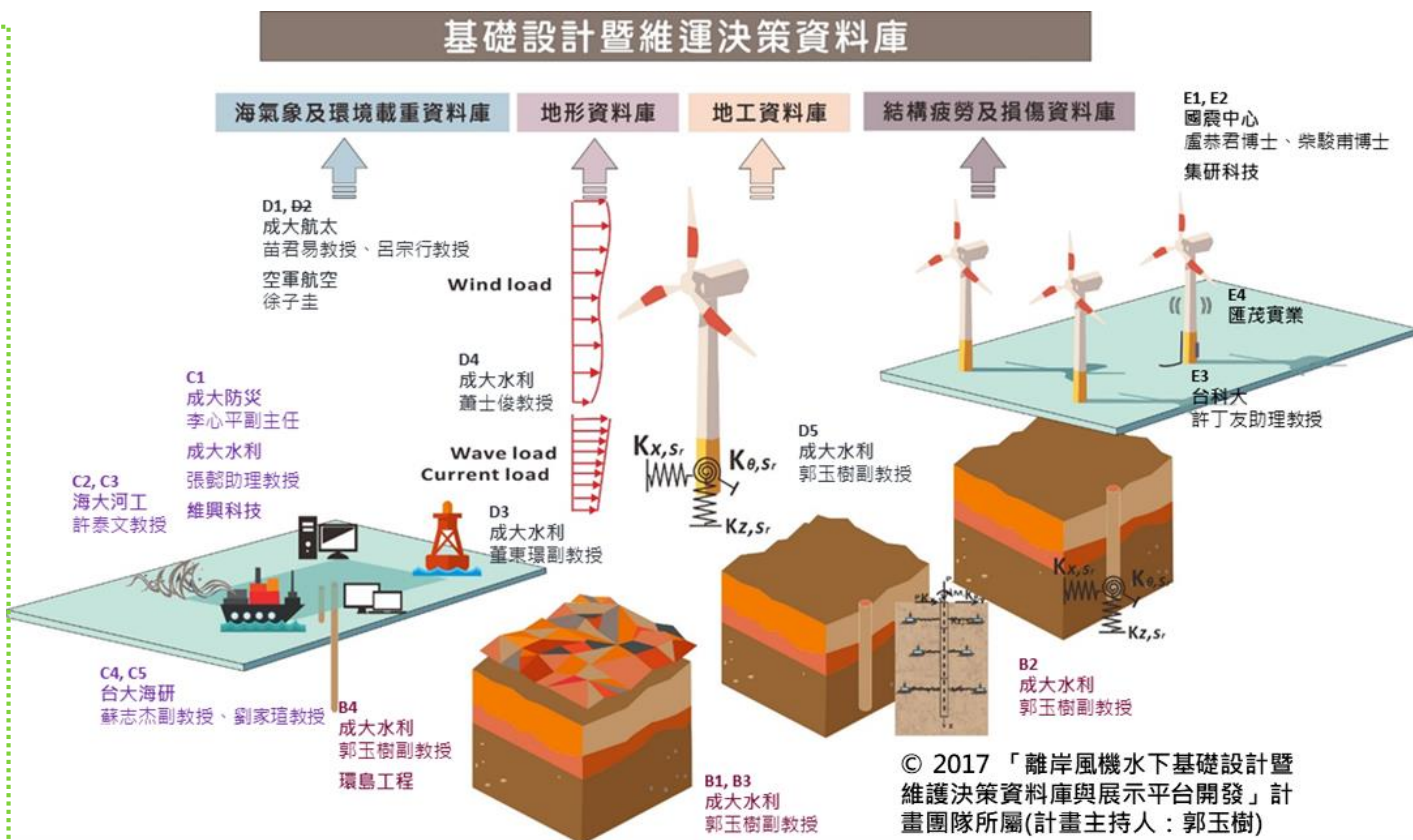
成功大學水利及海洋工程系

計畫主持人

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學界團隊(成大水利、台大海研、國震中心、海大河海、臺科大營建、航空技術學院)與產業團隊(中鋼、台灣世曦、海洋風力發電、環島工程、資拓宏宇、滙茂實業、維興科技、集研科技)合作開發離岸風機基礎動態行為及損傷監測系統、腐蝕監測與維護系統、地工地形與結構損傷資料庫等核心技術，支援離岸風機本土產業達成基礎開發、設計、維運、延役之目標。

1. 視覺化工程地質與地形模型
2. 地工設計參數資料庫及災害潛勢分析模組
3. 離岸風機基礎動態勁度計算模型
4. 離岸風機動態行為實測資料庫與健康診斷系統
5. 離岸風機基礎腐蝕監測系統
6. 海況資料統計與淘刷監測模組
7. 離岸風機水下基礎設計暨維護決策資料庫與展示平台



● 計畫簡介:

本計畫透過產學團隊合作，建構離岸風機基礎設計暨維護決策系統。從基礎設計端考量離岸風場開發商基礎設計成本及後續維護運轉需求，串連水下基礎設計、製造與以及維運產業，提供海域土壤地質調查公司(環島工程)調查規劃與成果展示關鍵技術；協助設計工程顧問公司(台灣世曦)建立視覺化基礎勁度計算關鍵技術、支撐結構受力分析計算串接技術；提供監測技術公司(維興科技、集研科技)關鍵概念，協助開發基礎淘刷監測設備與支撐結構振動監測設備；導引金屬防腐蝕公司(滙貿實業)開發離岸風機腐蝕監測系統；整合離岸風機支撐結構安全評估需求項目，協助本土離岸風場開發商(海洋風力發電)厚植水下結構與基礎安全評估與維護技術能量，加速建置本土離岸風電維護產業。同時，結合我國防災科技技術，邀集網路科技應用公司設計與維護決策應用資料庫，提供我國本土離岸風場開發商(中鋼、海洋風力發電)進行水下結構與基礎整體設計規劃應用。

● 核心技術:

1. 三維工程地質模型建構模組
2. 地工設計參數推估模組
3. 三維工程地質災害潛勢展示模組
4. 基礎穩定性與動態基礎勁度計算模組
5. 海床地形變動演算模組
6. 基礎局部淘刷模擬模組
7. 基礎淘刷監測系統
8. 海況資料統計模組
9. 波流載重計算模組
10. 基礎設計地工參數與地形資料庫
11. 支撐結構振動與損傷監測系統
12. 支撐結構動態反應健康診斷識別模組
13. 水下基礎腐蝕監測系統
14. 水下基礎設計與維護決策展示系統

Engineering databank and information modeling platform for offshore wind turbine foundation design and maintenance management

Execution Unit

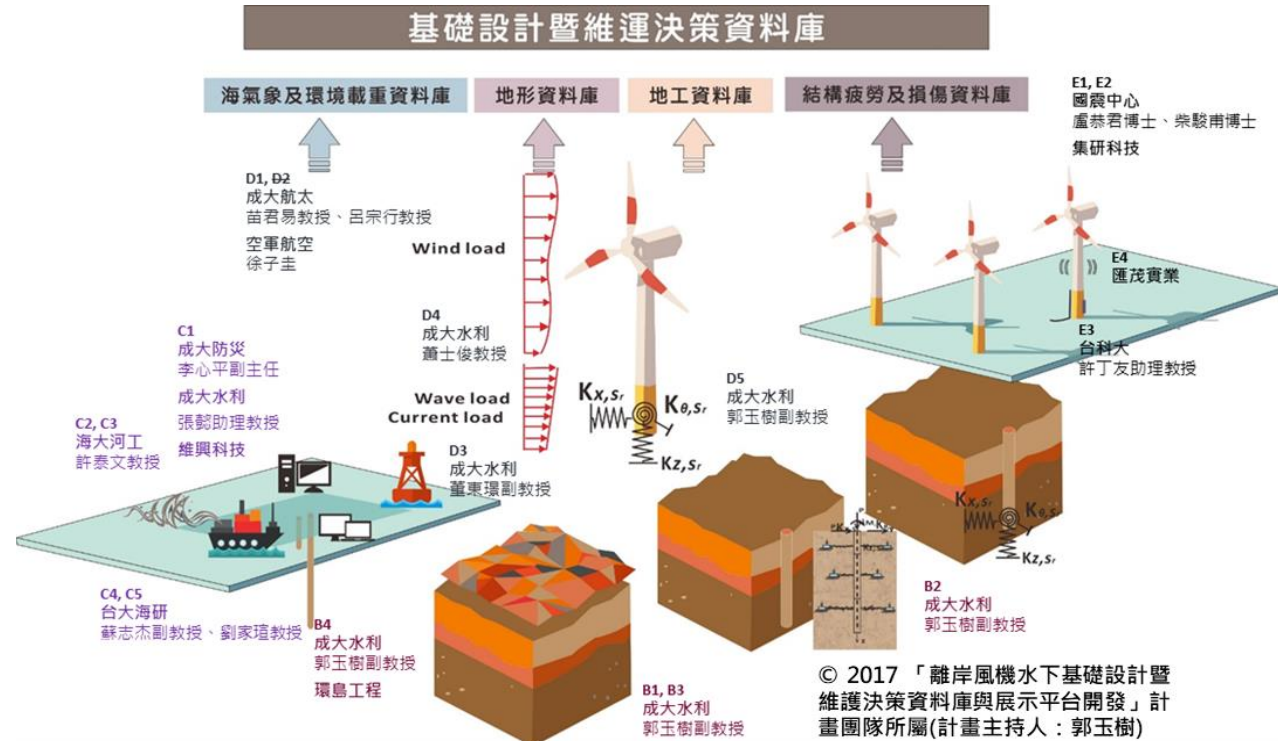
Dept. of Hydraulic and Ocean Engineering, NCKU

Project Director

Associate Professor KUO, YU-SHU

The research initiative is supported by the Ministry of Science and Technology and is coordinated by Laboratory of Geotechnics and Energy (LOGE), HYD, NCKU. This project joins together the scientific activities of the offshore wind farm owners, foundation manufacturers, engineering consultant companies, soil investigation company, information system companies, corrosion prevention company, technology companies and a multitude of research institutes. This project will gather fundamental experience with a view to future commercial use of offshore wind turbine foundation design and maintenance in Taiwan.

- 3D ground and geo-hazard demonstration platform
- Dynamic foundation stiffness calculation model
- Foundation vibration monitoring databank and structure health monitoring system
- Foundation scour monitoring and evaluation model
- Corrosion monitoring and maintenance system
- Engineering databank and information modeling platform for offshore wind turbine foundation design and maintenance management



● Content of the Research Project :

The main purpose of research project “Engineering databank and information modeling platform for offshore wind turbine foundation design and maintenance management” is to create databank collecting the environmental and engineering data for foundation design and maintenance. The topography, metrological conditions, geological conditions, geotechnical parameters of the offshore wind farm near Chang-Hua are collected from the field tests in this project. The supporting structural vibration, sea cable deformation, foundation scouring and potential of sacrificial anode cathode system are collected from the monitoring program on the demonstrated offshore wind turbine in Taiwan. Key technologies for foundation design and maintains developed in this project bring the value-added services for offshore wind farm developer and engineering consultant company. The visualized three dimensional ground model are collaborated with finite element model to determine the dynamic foundation stiffness. The topography near foundation with scour are determined from the analysis of sediment transport. The structure health monitoring system and integrated supporting dynamic responses analysis model evaluate the damage of offshore turbine foundation. Engineering databank for offshore wind turbine foundation design and maintenance is high variety information assets that enable enhanced decision making and process optimization.

● Important techniques :

1. 3D ground and geo-hazard demonstration platform
2. Geotechnical parameters evaluation model
3. Dynamic foundation stiffness calculation model
4. Seabed morphology evaluation model
5. Foundation scour monitoring and evaluation model
6. Met Ocean conditions statistic model
7. Wave and current loads calculation model
8. Geotechnical and seabed morphology databank
9. Foundation vibration monitoring system
10. Structure monitoring system
11. Corrosion monitoring and maintenance system
12. Engineering databank and information modeling platform for offshore wind turbine foundation design and maintenance management