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### 浮游式黑潮發電渦輪機之流體動力性能實驗分析

# Experimental Investigations on the Hydrodynamic Performance of a Floating Kuroshio Current Turbine

蔡進發<sup>1</sup>、曾怡瑄<sup>1\*</sup>

<sup>1</sup>國立台灣大學工程科學及海洋工程學系

Jing-Fa Tsai, Yi-Xuan Zeng<sup>1\*</sup>

<sup>1</sup>Department of Engineering Science and Ocean Engineering, National Taiwan University  
r03525101@ntu.edu.tw

## 摘要

本研究建立一浮游式黑潮發電渦輪機實驗系統含黑潮發電機模型及流體動力量測系統，量測系統中設置扭矩模擬機、轉速計、推力計及扭力計，在拖曳水槽中測試在流速 1.5m/s、1.2m/s 及 1.0m/s 之情況下的葉片轉子的流體動力性能，並將實驗結果與黏性流方法(RANS)計算結果做比較。實驗結果顯示在三個流速下，葉片轉子之馬力係數曲線(Power Coefficient Curve)及扭矩係數曲線(Torque Coefficient Curve)的實驗結果與計算值吻合，而推力係數曲線(Thrust Coefficient Curve)之實驗結果高於計算值許多，由相關風力發電機的文獻推測為流體通過轉子葉片後之速度有明顯的下降，導致推力係數之實驗結果高於計算值。

關鍵詞：浮游式黑潮發電渦輪機、海流渦輪機、拖曳水槽實驗、流體動力性能實驗。

## Abstract

This study established an experimental model and hydrodynamic measurement system of Floating Kuroshio Turbine (FKT) which includes torque simulator, tachometer, thrust and torque Gauges. The hydrodynamic performance of the current turbine blade was tested in the towing tank for the velocities of 1.0, 1.2 and 1.5m/s. The tested results were compared with the results calculated by a viscous flow RANS solver. The measured power coefficient and torque coefficient agreed well with the calculated results. However, the measured thrust coefficient was significantly higher than the calculated results. According to the reference of the wind turbine, the extra flow velocity reduction when the flow passes through the turbine blade would cause the measured thrust coefficient higher than that of calculated.

**Keywords:** Floating Kuroshio Turbine、current turbine、towing tank experiment、hydrodynamic performance.