

5MW離岸風力發電機運轉操控模式、監控及電能轉換技術之研究

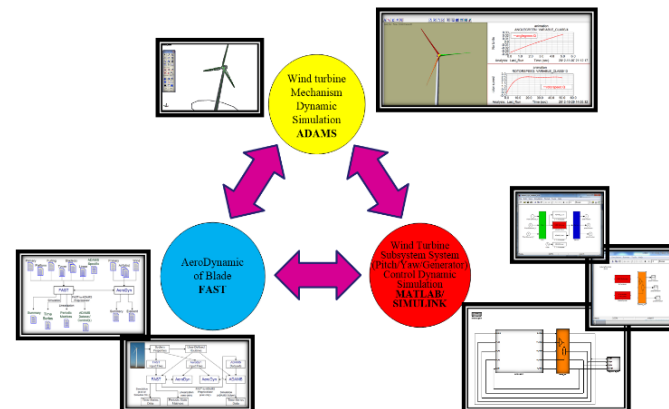
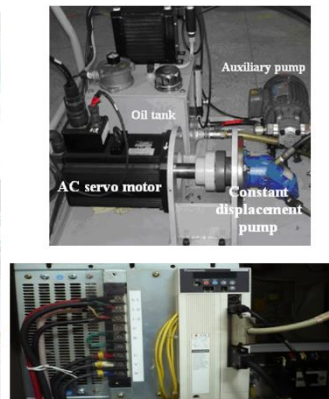
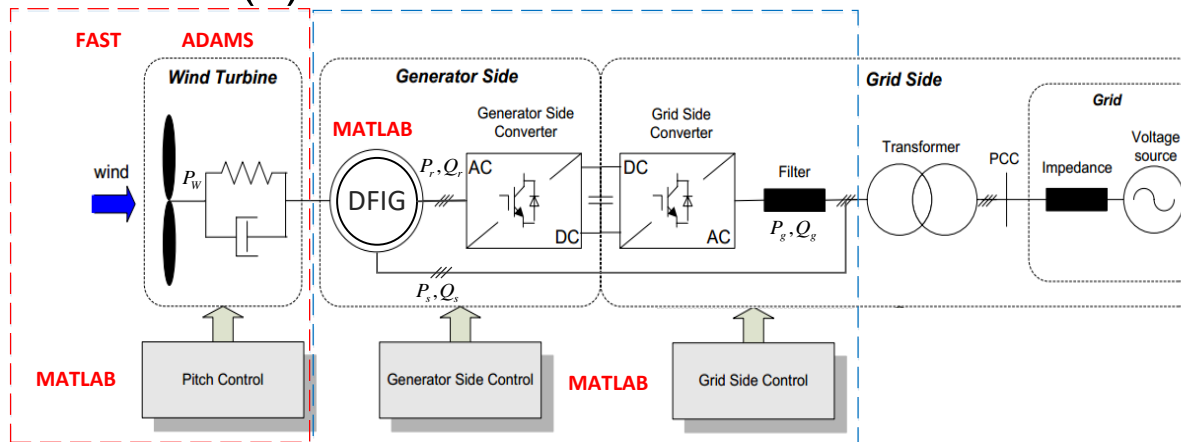
執行單位

國立臺灣大學工程科學及
海洋工程學系暨研究所

計畫主持人

江茂雄/李坤彥

- 發展5MW離岸風機之運轉操控模式、監控系統設計及併網前電能轉換與控制技術，主要針對三部分包含：(1)運轉操控模式設計分析(2)監控系統設計規劃(3)併網前電能轉換與控制技術。



- 完整建立葉片旋角控制、發電機側控制、併網側控制。整合葉片空氣動力、風機機構動態、葉片旋角控制系統、發電機、電能轉換、以及併網系統，為國內首創之完整大型風機動態模擬分析技術。
- 創新整合FAST、ADAMS、MATLAB/SIMULINK發展風機全機動態模擬分析軟體技術。
- 發展創新高響應高效率之離岸風機葉片液壓旋角控制實驗系統，採用硬體迴路(Hardware-in-the-loop)的概念，結合實驗系統與即時動態模擬分析，可同時實現實際之液壓伺服葉片旋角度控制以及風力發電機全系統之動態特性模擬分析，也建立國內離岸風機旋角控制系統之設計、分析及製造能力。

Operation Control Mode, Monitoring and Energy Conversion Technology of 5MW Offshore Wind Turbine

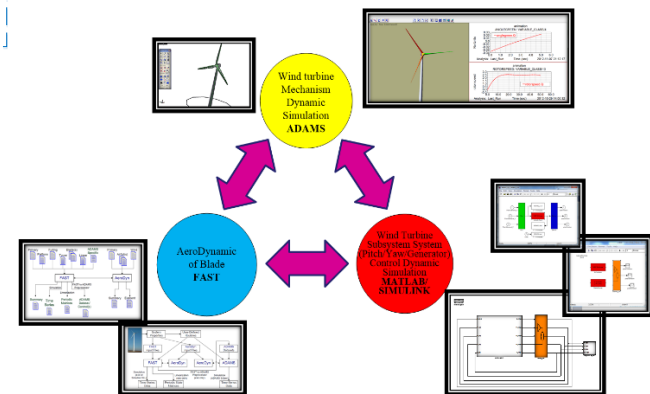
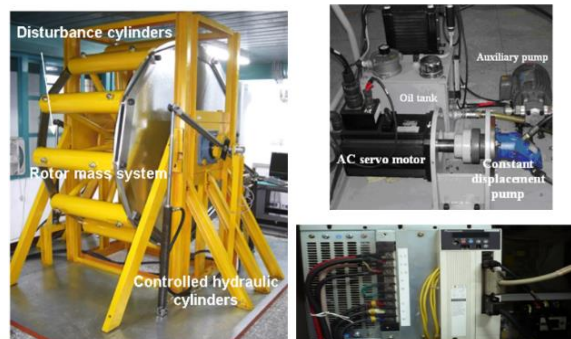
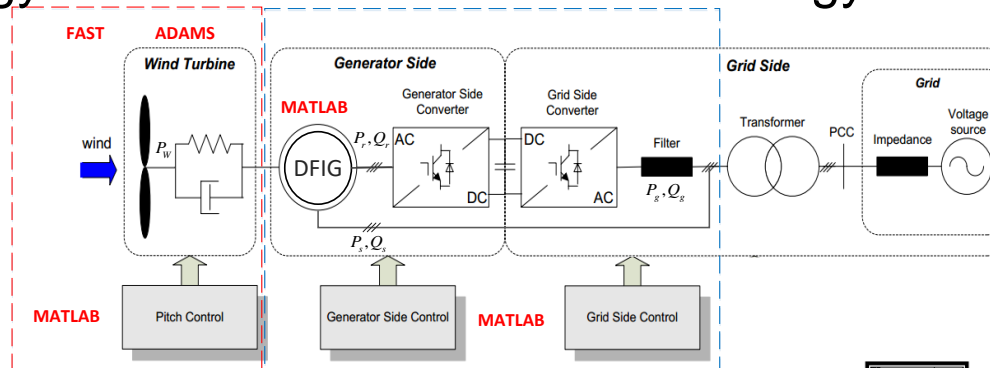
Execution Unit

Department of Engineering Science and Ocean Engineering,
National Taiwan University

Project Director

Mao-Hsiung Chiang / Kung-Yen Lee

- Development of 5 MW offshore wind turbine operation technologies, which mainly include: (1) operation control mode design and analysis, (2) monitoring and control system design and arrangement, (3) energy conversion and control technology.



- Completely establishing pitch control, generator side control, and grid side control systems. In addition, integration of blade aerodynamics, mechanism dynamics, pitch control system, generator, power conversion, and grid-connected system is completed for a large scale wind turbine dynamics simulation technology in Taiwan for the first time.
- Integration of FAST, ADAMS, and MATLAB / SIMULINK for the whole wind turbine dynamics simulation technology in Taiwan for the first time.
- Development of the innovative fast-response-high-efficiency pitch control system of an offshore wind turbine via hydraulic pressure. The concept of Hardware-in-the-Loop is used to combine the experimental system with the real-time dynamics simulation, which can simultaneously achieve the actual pitch control via hydraulic pressure and the dynamic characteristics simulation of the whole wind turbine system.