

Control Co-design Optimization Of A Floating Offshore Wind Turbine Blade Using A Multi-objective Genetic Algorithm

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INTRO

- The design of the rotor blades critically effects the overall performance of the wind turbine.
- Optimizing the structural and control parameters can improve the overall performance of the wind turbine.
- Different sub-systems of a floating offshore wind turbine are highly coupled, so an optimization approach that considers the interaction between these sub-systems is required.

METHODS

1. Developing a multi-objective optimization framework.
2. Design and development of numerical simulations for evaluating wind turbine performance.
3. Design and execution of experimental studies using a wind tunnel to validate the proposed design.

RESULTS

- A parametric analysis is conducted using the parameterized blade model
- The optimal configuration for blade distributed properties is obtained.

DISCUSSION

- A multi-objective optimization framework is developed.
- Experimental setup for wind tunnel is designed and tested.

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ACKNOWLEDGEMENTS: This research is supported by Rutgers University and New Jersey Economic Authority (NJEDA) through Wind Institute Fellowship Program. The authors acknowledge the contributions to previous research by Cody Wright and Bharg Shah.

1- Parameterized Floating Offshore

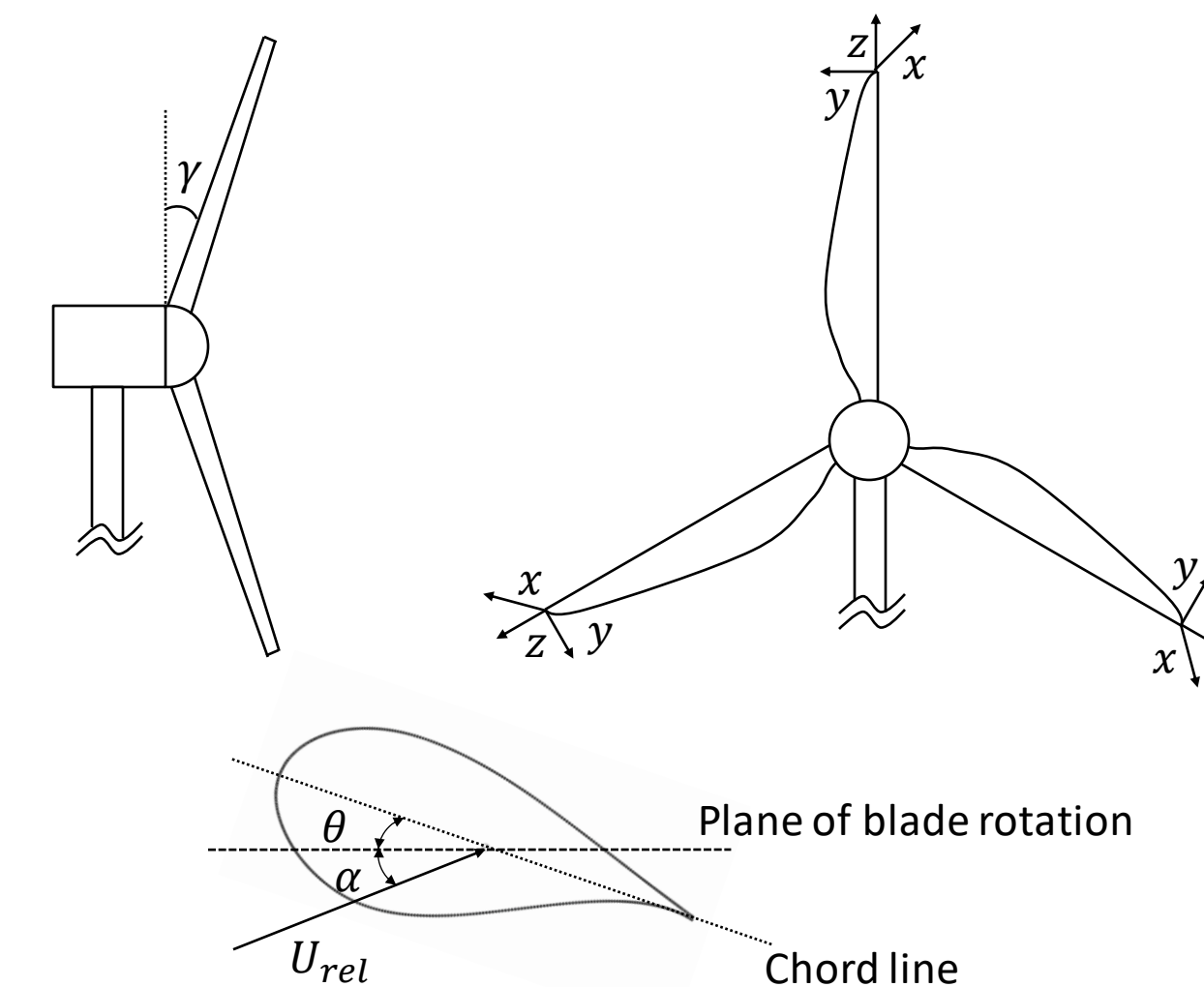
Wind Turbine Model

2- Multi-Objective Optimization

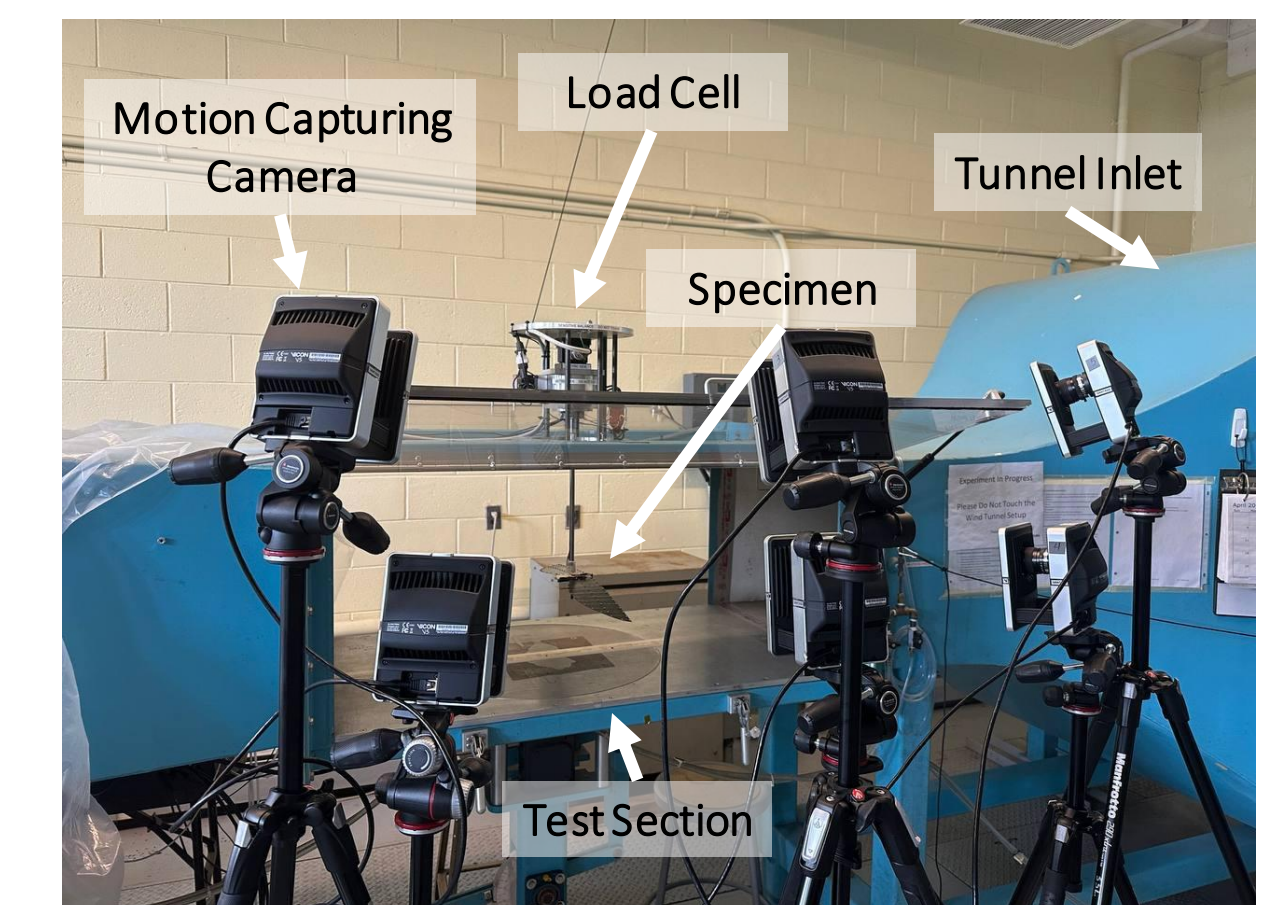
Framework

3- Wind Tunnel Experiment Setup

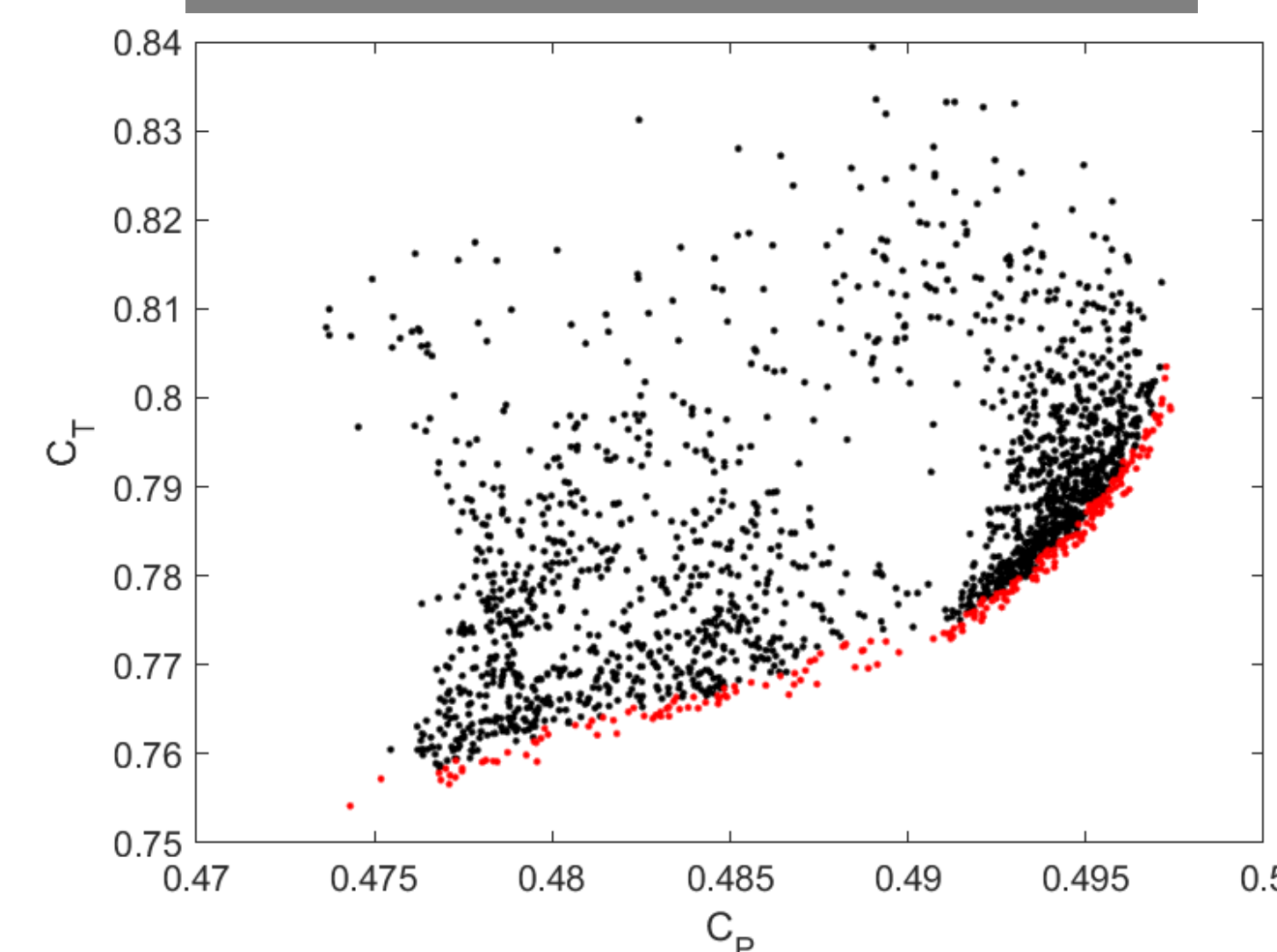
Wind Turbine Parameterized Model



Wind Tunnel Experiment Setup



Optimization Fitness Distribution



Optimized Blade Distributed Properties

