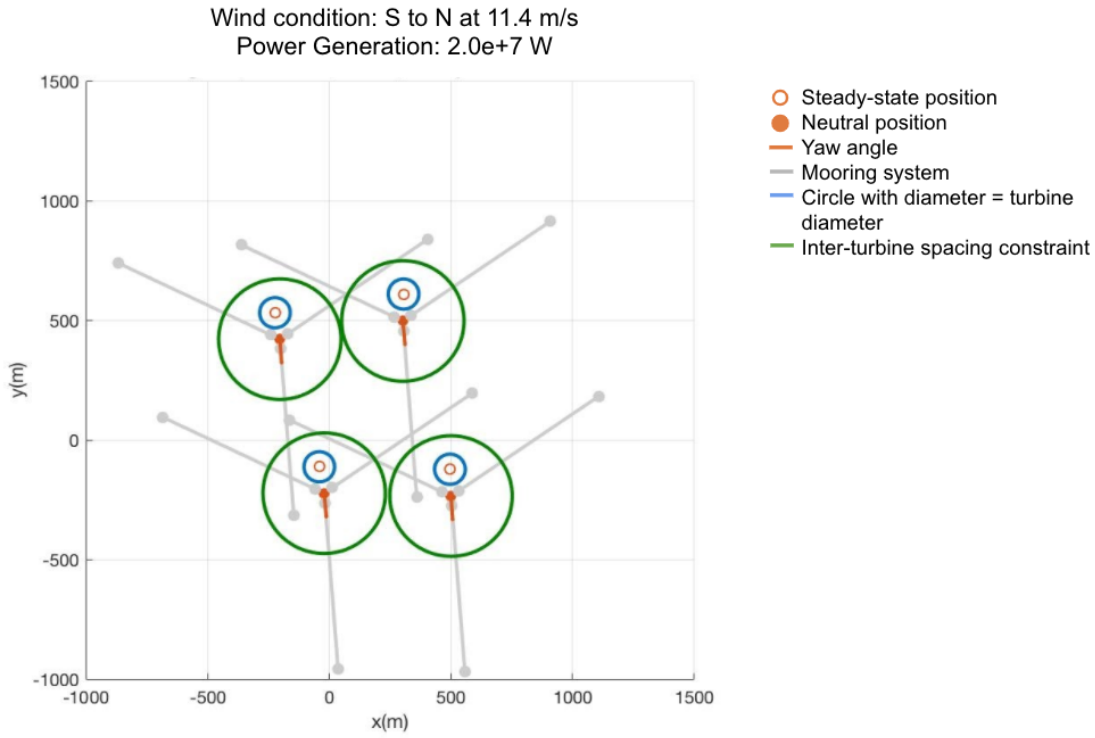
MECH 493 Web Summary

Optimal Design of a Floating Offshore Wind Farm



Floating offshore wind farms are known to have great power generation capabilities, but there are high construction, operation, and maintenance costs associated with them. One approach to improve the economic viability of floating offshore wind farms is to improve power generation efficiency through wind farm design optimization, thereby improving the cost effectiveness of offshore wind power generation. The design parameter optimization problem for conventional onshore wind farms with fixed bases has been studied extensively. However, there are very few studies on the design parameters optimization of floating offshore wind farms consisted of moveable turbines. Using a nested optimization framework that encapsulates operating parameter optimization within an outer design parameter optimization layer, test cases are generated to investigate how wind farm power generation is affected by the use of layout optimization, choice of optimization algorithm, and tuning of Particle Swarm Optimization (PSO) settings. This project demonstrates improved wind farm power generation with turbine layout optimization, the use of a global optimization algorithm, and PSO swarm size tuning.