# Model Predictive Control for Wake Steering: a Koopman Dynamic Mode Decomposition Approach

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## Objectives:

- Find a Reduced Order Model (ROM) for a two turbine offshore wind farm system where Wake Redirection Control by yaw misalignment is used.
- Use Input Output Dynamic Mode Decomposition to map yaw angle to produced power and reconstruct wake.
- Design a Model Predictive Controller (MPC) and implement it in Simulator for Offshore Wind Farm Applications (SOWFA).

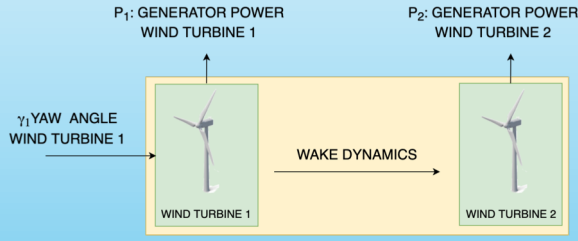


Fig 1.: Wind Farm system to be modelled

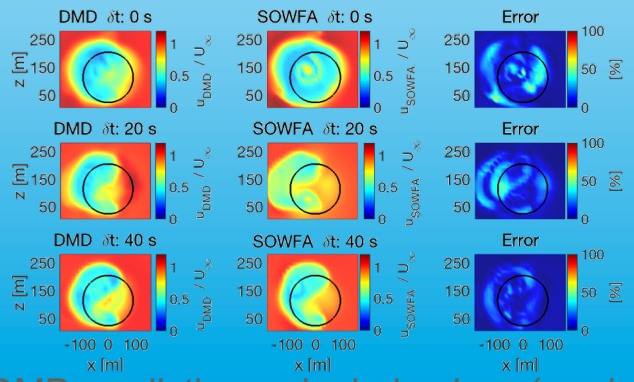


Fig 2.: IODMD predicting wake behaviour *(u velocity)*

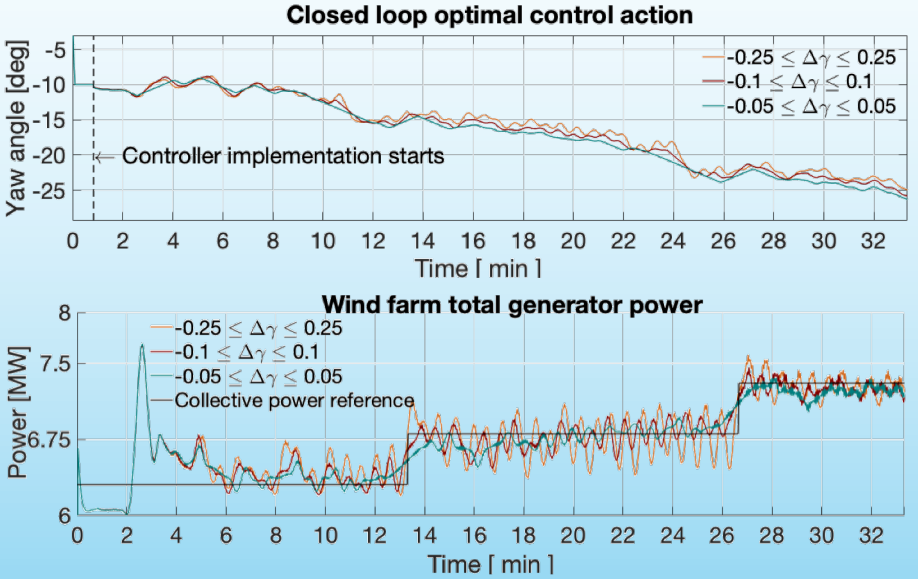


Fig 3.: Closed-loop testing of MPC in SOWFA

## Results:

- ROM with 37 states reproduces generator power with fit of 99% and 88% for first and second turbines, respectively.
- Wake is predicted with an average NRMSE of 4%.
- Turbines work cooperatively in SOWFA by using MPC and a pre-defined amount of total power is produced.

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