Introduction

- Why do we need 12 MW Floating Offshore Wind turbine (FOWT)?
  - Able to use in Deep Water: the stable and strong wind flows.
  - Improve energy production capacity and reduce construction costs.
  - Solution for noise and insufficient space.
- The purpose with the design of a 12 MW UOU (University of Ulsan) FOWT.
  - Desing of FOWTs must consider both aerodynamics and hydrodynamics.
  - The floating platform has the lowest natural frequencies.
  - Initial dimensional design of tower to avoid buckling and resonances.
  - Solution for unstable coupling between platform motion and pitch controller.
- Dynamic responses analysis for initial design of a 12 MW UOU FOWT using fully coupled analysis was performed to determine the suitability.

Design of 12 MW Floating Offshore Wind Turbine

- The initial design of 12 MW UOU FOWT was performed based on a 5 MW NREL wind turbine for offshore model, using geometric laws of similarity.

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Tower Resonance Analysis

- A tower design is proposed to avoid the 3P resonance problem due to the direct expansion of the 5 MW wind turbine support.

Control system of 12MW FOWT

- In the case of a FOWT, the negative damping problem occurs when applying conventional pitch control system of land-base wind turbine.
- The negative damping has the reducing rated power and increasing fatigue load.
- 12 MW FOWT was modified, the PI controller to avoid negative damping problem and the response speed of the blade pitch controller to be lower than the response speed of the platform.

Numerical simulation

- Initial design of a 12 MW UOU FOWT using fully coupled analysis was performed to determine the suitability.

Conclusion

- Initial design of a 12 MW UOU FOWT using fully coupled analysis was performed to determine the suitability.
- Dimensions of tower was approved by buckling analysis.
- 3P Resonance avoided through the redesign of the tower.
- Negative damping was solved through the response speed control of the blade pitch controller.

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