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Comparative study of floating concepts

Increasing demand for energy and associated services to meet social and economic development and improve human welfare and health leads to a number of different wind energy technologies available across a range of applications. The Vertical axis wind turbines (VAWT) have several advantages compared with Horizontal axis wind turbines (HAWT) such as lower centre of gravity, absence of yaw and pitch control system as well as gear box, which seems to be well fitted for floating offshore application. The difficult to develop the floating VAWT is mainly the feasibility and reliability of a new concept consisting of VAWT, floater and related mooring lines.

The research will be focused on dynamic response of floating vertical axis wind turbines for different support structure such as spar type floaters, with a catenary or tension leg mooring system, TLP and semi-submersible type. It is essential to create a time domain model of the floating vertical axis wind turbine where hydrodynamic loads on the structure are considered based on the linear hydrodynamic theory while the mooring lines are modeled as flexible finite elements. By combining the aerodynamic loads on the rotor and the hydrodynamic loads, the dynamic response of the floating platform can be simulated in the time domain so as to investigate the feasibility of the floating concept and the motion of the platform under the environmental loads.