Feasibility study of a semi floating spar buoy wind turbine anchored with a spherical joint to the sea floor

The feasibility of a semi floating platform offshore wind turbine system is investigated at 120m water depth. The semi floating system consists of a 5MW wind turbine on a floater with mooring lines similar to a spar buoy and strongly anchored with a spherical joint to the sea soil. The stability of the newly designed floater and mooring assembly are analyzed from static and dynamic simulations of the wind turbine. The design loads on the universal joint on the sea floor are tuned with the needs for a ballast chamber. Using load simulations in the HAWC2 software, ultimate and equivalent fatigue loads are obtained and compared with the corresponding loads from the same wind turbine mounted on a spar buoy and as a land based wind turbine. The results show a reduction in the ultimate and equivalent fatigue loads for the new system.

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