The variation in simulated monopile substructure loads is quantified by validating an aero-hydro-servo-elastic design tool with offshore foundation load measurements. A three bladed 3.6MW pitch controlled variable speed wind turbine for offshore monopile foundations is modeled in the HAWC2 simulation code. A flexible soil model is included in the analysis. Fatigue loads analysis is performed for both the dynamic simulations and on-site foundation strain measurements. The wind farm wake effects on the monopile fatigue loads is also examined and compared with load measurements. Potential discrepancies between simulated loads and measurements are detailed and explained.

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