

Fatigue of floating wind moorings under combined wave and current loading

Track 02 · Offshore Wind & Marine Renewables · Oral presentation

OBJECTIVES AND SCOPE

25–75 words

Moorings on floating wind turbines see load cycles that no fixed structure sees. We set out to measure how combined wave and current loading changes the fatigue life of chain lines at a North Sea site, and to give designers a correction factor they can use today.

METHODS

75–100 words

Three months of tension records from an instrumented demonstrator were paired with metocean data from the same buoy. Rainflow counting gave the stress ranges. A coupled time-domain model was calibrated against the records and run for a fifty-year hindcast. Twelve chain samples from the recovered lines were sectioned and tested to failure to check the model against measured damage.

RESULTS AND CONCLUSIONS

100–200 words

Current loading raised the mean tension by 11 per cent but the damage rate by 34 per cent, because the shift moved the most common cycles onto a steeper part of the S-N curve. The calibrated model reproduced measured damage within 15 per cent. Applied to a standard design, the correction gives a fatigue life 22 per cent shorter than the uncorrected estimate, which closes most of the gap between predicted and observed line replacements.

NOVELTY AND VALUE TO INDUSTRY

25–75 words

This is the first correction factor derived from full-scale North Sea data rather than tank tests. It fits the current design standard without new software, and the operator partner will use it in its next tender.

Keywords: floating wind; mooring fatigue; metocean; field data; design correction

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