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TITLE: Observation and comparison of tower vibration and underwater noise from offshore operational wind turbines in the East China Sea Bridge of Shanghai

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ABSTRACT:

Underwater operational turbine noise emitted by China's first offshore wind farm in the East China Sea Bridge of Shanghai was measured and analyzed in this study. Two sensors were used in the measurement: a hydrophone recording the underwater sound and an accelerometer placed in the turbine tower detecting the tower vibrations. Measurements were performed at two different types of wind turbines: a Sinovel 3 MW SL3000 turbine and a Shanghai Electric 3.6 MW W3600 turbine. The two turbines show similar tower vibration characteristics, characterized by a number of tonal components, mainly in the low-frequency domain (30?500 Hz). The peak vibration frequencies changed with the wind speed until the turbine approached its nominal power rating. Spectral analysis of the underwater acoustic data showed that the amplitude spectra had a strong correlation with the spectra of the turbine vibration intensity level, indicating that the measured underwater noise was generated by the tower mechanical vibration.

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