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Absracts

Data is a key component for all offshore wind projects. However, there remains significant challenges ahead, not least of which is the availability of good quality data to facilitate better project planning and accurate yield prediction. To address this the EU-NORSEWinD project was established in order to create a wind atlas of the North, Baltic and Irish seas by mounting instrumentation on offshore installations to assess the local wind conditions.

Because all of the offshore installations are large structures it was deemed necessary to assess the interference effects of the structures on the wind data acquired.

Methods

To assess the effects of the platforms on the RS measurements, the flow fields over each platform have been simulated by Computational Fluid Dynamics (CFD). CFD allows the flow field around each platform to be calculated and the velocity vector at any point in the flow field to be determined.

To verify the accuracy of the CFD model, sub scale wind tunnel and test platforms are also conducted. Figure 2 shows a 75% scale model of an offshore platform in the University of Strathclyde 1.5m, open working section, low speed wind tunnel. Measurements in the low speed wind tunnel were made with a DANTEC Streamline constant temperature (CTA), triple wire, hot wire anemometer mounted on a three dimensional traversing rig, figure 3.

Results

Figure 4 shows the distortion of the flow field by streamlines. Figure 5 shows velocity vectors which exhibit recirculation zones.

Conclusions

It has been shown that, through a combination of CFD and experimental techniques, the flow field over an offshore structure can be simulated and the interference on the calculated velocity vector from an RS anemometer determined.

References

3. “Probe Catalogue”, Dantec Dynamics

Figure 1: LIDAR wind measurement [1]

Figure 2: Low speed wind tunnel model.

Figure 3: Probe and traverse system

Figure 4: Streamlines over an offshore platform from CFD.

Figure 5: Velocity vectors which exhibit recirculation zones.

Figure 6: Comparison between CFD and experimental data

Figure 6 shows that the CFD and experimental data agree reasonably well. From the CFD data the velocity at the proposed full scale measurement height is calculated using the same algorithm as the LIDARs and the effect of the distortion on the measured data assessed.