- **Notation – Boundary Layer Height (Line 37 and elsewhere):** In boundary layer meteorology, *zi* is typically used for convective conditions only and refers to the height of the first inversion. In neutral and stable conditions, the ABL height is usually denoted *h*. I recommend avoiding the use of *zi* for neutral or stable boundary layer depth.
- **Equation (1) and Lines 30–35:** The current wording is unclear, as the text starts with "For offshore conditions" and then states "Equation (1) is valid over land only". This could be reformulated more efficiently. If *U* is not explicitly defined as hub-height wind speed, the equation introduces an implicit dependence on height through the mean wind speed. According to IEC 61400-1 Ed. 4, *U* in Equation (1) is defined at hub height and therefore depends on turbine height (smaller turbines generally experience higher turbulence intensity than larger ones). The notation for wind speed should be clearly distinguished from that used in Equation (2).
- **Consistency of notation (general comment):** Please, ensure that notations are unambiguous and consistent throughout the manuscript. IEC standards typically use hub-height wind speed, whereas this is not always the case in the scientific literature. Please verify that all equations follow a consistent convention and adjust where necessary.
- **Technical issue – references:** Some LaTeX references appear as "?". Please check that all BibTeX entries are valid and correctly compiled.
- **Equation (24) – applicability:** As noted by Reviewer 1, Equation (24) (Högström et al., 2002) applies to the neutral surface layer only and is "approximately valid in the surface layer down to at least 1.6 m above the ground". This limitation should be made explicit. Currently, the equation may appear applicable to the entire ABL, which is misleading. More generally, Equation (24) and the surrounding discussion may not be appropriate unless the paper specifically focuses on neutral surface layer flow (i.e. below ~100 m). If Equation (24) is not used in the analysis, it should be removed.
- **Response to Reviewer 1 – Comment 7:** The current response does not fully address the reviewer's concern. The relation *h = alpha u*/f* is only valid under neutral or stable conditions. The reviewer questioned the choice of alpha = 0.3. While Högström et al. (2002) use this value, it remains somewhat arbitrary and should be better justified.
- **Turbulence scaling (general comment):** The relationship between sigma_u and u* is known not to scale with z/L, particularly under stable conditions. Panofsky et al. (1977) discuss this in detail and show that sigma_u/u* and sigma_v/u* are independent of height in convective conditions, whereas sigma_w/u* behaves differently. Their formulations are valid across the entire ABL and appear to

contradict some equations in Section 2.5 (e.g. Equation 23), which should be reassessed.

- **Reviewer 1 – Comment 9 (Figure 4):** My suggestion would be to avoid filled contour plots and use a pseudocolor plot instead. I recommend avoiding the jet colormap and use a perceptually uniform colormap. Consider limiting the colorbar lower ran to 0.02 or 0.03 instead of 0.00 to better highlight local variations in turbulence intensity. The figure appears to be dominated by low wind speed regions, which inherently increase turbulence intensity; this effect is not adequately discussed (lines 395–400) and should be explicitly addressed.
- **Equation (7) – turbulence spectrum definition:** The term "turbulence power spectrum" is unclear, as it depends on the velocity component considered. Please clarify whether the spectrum refers to the horizontal wind component or the along-wind (streamwise) component. Note that Kaimal and Mann models decompose turbulence into along-wind and cross-wind components rather than directly describing the horizontal component. There is currently an inconsistency between Equation (6), which refers to the horizontal component, and Equation (8), which refers to the along-wind component. If Equations (8)–(9) are used to derive sigma_U, the manuscript becomes inconsistent by conflating these components. In that case, the horizontal component should be reconstructed by combining along-wind and cross-wind contributions. This point should be clarified, as it may affect the internal consistency of the methodology.

References

Panofsky, H. A., Tennekes, H., Lenschow, D. H., & Wyngaard, J. C. (1977). The characteristics of turbulent velocity components in the surface layer under convective conditions. *Boundary-Layer Meteorology*, *11*(3), 355-361.

Högström, U., Hunt, J. C. R., & Smedman, A. S. (2002). Theory and measurements for turbulence spectra and variances in the atmospheric neutral surface layer. *Boundary-Layer Meteorology*, *103*(1), 101-124.