In order to parameterize ITC of the wind components inside the roughness sub layer and a forest, which needs to be done for quality control, the dimensionless height $* = h_0 / z$ should be used instead of $z$. Since ITC are influenced by stability and the structure of the stand it is useful for measurement heights inside the stand and lower roughness sub layer to combine for near neutral stratification Equation 1, representing the stand influence, and for stable and unstable stratification the parameterizations from Table 1 (Figure 3). As input for Equation 1, measurements in mean canopy height ($h_c$) should be used, if these are not available, literature values can be used instead. The coefficients $a$, $b$, and $c$ are site specific and need to be adjusted to each stand structure. This parameterizations can be used for quality assessment routines but it is very site specific, therefore further investigation is necessary for a general application.

**Equation 1:** Parameterization to account for influence of the stand structure on integral turbulence characteristics, modified after Rannik et al. (2003).

\[
\frac{\bar{u}^2}{u^2} = c_1 \left( \frac{z}{h_c} \right) \exp \left( - 1 + \frac{z}{h_c} \right) \left( 1 + \gamma z \right)
\]

**Table 1:** Parameterizations for integral turbulence characteristics under stable and unstable conditions. As input measured near neutral values should be taken or the ITC for the desired height can be parameterized by the Equation above.

<table>
<thead>
<tr>
<th>Stratification</th>
<th>$0.01 &lt; \zeta &lt; 1$</th>
<th>$-1 &lt; \zeta &lt; -0.032$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_{u/h}$</td>
<td>$0.1 (h_c/z)$</td>
<td>$0.05 (h_c/z)$</td>
</tr>
<tr>
<td>$a_{v/h}$</td>
<td>$0.0001 (h_c/z)$</td>
<td>$0.0001 (h_c/z)$</td>
</tr>
<tr>
<td>$a_{w/h}$</td>
<td>$0.002 (h_c/z)$</td>
<td>$0.0002 (h_c/z)$</td>
</tr>
</tbody>
</table>

**Figure 1:** Measurement setup from EGER IOP1 (Serafimovich et al. 2009).

**Figure 2:** Profiles of integral turbulence characteristics ($u$, $u^2$) of $u$ (a) and $w$ (b) from different measurement sites during near neutral stratification. The stand at the Weidenbrunnen site (black cross) is spruce while the experiments by Rannik et al. (2003) (grey star) and Launainen et al. (2007) (blue diamond) at Hyytiala and from Mätzler et al. (2004) (green square) are done in a pine stand. The measurement height $z$ is normalized with the mean canopy height $h_c$.

**Figure 3:** Profiles of integral turbulence characteristics of the three wind components $u$ (red), $v$ (blue), $w$ (black). Measured (symbols) and parameterized values (lines), under stable (a), near neutral (b), and unstable (c) stratification.

**Figure 4:** Profiles of integral turbulence characteristics of the three wind components $u$ (red), $v$ (blue), $w$ (black). Measured (symbols) and values modeled by ACASA (lines) under stable (a), near neutral (b), and unstable (c) stratification. Subfigure (d) shows the measured (symbols) and modeled (lines) normalized wind speed, under stable (light blue), near neutral (black), and unstable (dark blue) stratification.

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