Wind Farm Noise: Measurement, Assessment and Control: Errata and clarifications, September 2, 2020

Page 17. The constant on the RHS of Equation (1.1) should be 74.9.

Page 17. The constant on the RHS of Equation (1.2) should be 59.6.

Page 28. Two lines above Section 1.4.5, replace 6 dB with 12 dB

Page 114. Three lines above Equation (2.127), replace $\hat{R}_{xx}(t_k)$ with $\hat{R}_{xx}(k)$

Page 115. Top line, replace $\hat{R}_{xy}(t_k)$ with $\hat{R}_{xy}(k)$

Page 190. In Figure 5.3, the vertical axis shouldbe labelled "Wind shear coefficient, ξ"

Page 191. Table 5.2 caption, change "empirical" to "wind shear"

Page 191. In Equation (5.17), replace (h_0/z_0) with $(h_0/z_0 + 1)$ (2 places)

Page 196. First line, change "lower" to "higher"

Page 196. The term, $\left(\dfrac{h}{z_0}\right)$ in Equation (5.26) should be replaced with $\left(\dfrac{h}{z_0} + 1\right)$

Page 198. Delete the text and equations beginning just below Equation (5.36) and ending immediately above Equation (5.54) on page 200, and replace with the following. "An approximate expression may also be used to calculate R_B, as given in earlier Harmonoise documentation (Nota and van Leeuwen, 2004). That is:

$$\frac{1}{R_B} \approx \frac{8}{d_{SR}}\sqrt{\frac{B_m}{2\pi c}} \tag{1}$$

where d_{SR} is the distance from the source to the receiver (see Figure 5.5).

The radius of curvature is used in the Nord2000 and Harmonoise propagation models to calculate the path lengths and propagation times for sound travelling from the source to the receiver over a propagation path that has been curved as a result of atmospheric wind gradients and temperature gradients. Taking into account the ray curvature also allows more accurate calculation of barrier attenuation as discussed in Appendix E.

A more accurate means for calculating the radius of curvature of the sound ray involves using Figure 5.5 to obtain the following equation for ψ_S

in terms of R_c."

Page 200. Add the following text immediately after Equation (5.55). "Equation (5.28) is then substituted into Equation (5.54) to obtain the following transcendental equation:

$$\psi_S = -\sin^{-1}\left(\frac{dB_M \cos\psi_S}{2c(h + z_0)\cos\varphi}\right) \tag{2}$$

where z_0 is defined in Table 5.4 and h is the mean height above the ground of a straight line drawn between the source and receiver (usually equal to $(h_S + h_R)/2$).
The preceding equation must be solved iteratively to obtain ψ_S. Once ψ_S is known, Equation (5.28) can be used to obtain R_c. The angle, ψ_R, may be calculated using Equation (5.62)."

Page 200. Delete the sentence beginning 3 lines from the bottom of the page and the last 2 lines on the page.

Page 202. Delete the first 2 lines and the second and third full paragraphs, including Equation (5.56).

Page 204. Delete the two paragraphs that immediately follow Equation (5.60).

Page 204. Add the following immediately after Equation (5.61). "To be able to calculate the angle, θ, it is necessary to determine the location, (d_0, X) shown in Figures 5.5 to 5.9. From the figures:

$$d_0 \;=\; R_c \sin\psi_S \quad \text{and} \quad X \;=\; R_c \cos\psi_S \tag{3}$$

Page 204. Include the following text immediately above the heading beginning, "Ground-reflected Rays"
"Calculation of the location of the reflection point is needed in order to find the length of the reflected wave path from the source to the receiver. Calculation of this location requires the solution of a cubic equation and is discussed in Appendix D. Once this location is found, the angle at which the reflected wave leaves the source and its path length can be found using the same techniques as for the direct wave. The path between the source and reflection point is analysed by treating the reflection point as a virtual receiver, while the path between the reflection point and the actual receiver is analysed by treating the reflection point as a virtual source."

Page 209. 7 and 8 lines above Section 5.2.5, change "Bass (2011)" to "Figure 2a in Baas et al. (2009)"

Page 218. Equation 5.76, change "1.08" to "1.00" and following the equation, add: "If $\gamma < 0$, then set $\gamma = 0$".

Page 247. Equation (5.162), change the constant, "0.1365" to "5.3888" and replace the entire paragraph immediately following the equation with "Plovsing (2014), and".

Page 273. Third full paragraph, change "Cotton Farm" to "Cotton"

Page 275. 3 lines above Equation (5.216), sentence beginning "When multiple turbines....". Delete this sentence and the remainder of this section 5.12. Replace the deleted part with the following.

When multiple turbines are involved, the overall turbine sound power standard uncertainty can be calculated using Equation (5.212).

The overall expanded uncertainty, corresponding to 95% confidence limits of the prediction, at any specified receiver location, is greater than the standard uncertainty by a factor of 2 (assuming that the uncertainty is normally distributed). Thus, for most A-weighted environmental noise predictions, it would be wise to suggest that the variation between prediction and measurement for any particular location in a downward refracting atmosphere is of the order of ± 4 dBA, depending on the number of turbines involved.

Page 280. Second to top line, change "Figure 5.26" to "Figure 5.29"

Page 371. First paragraph under the heading "Correlation of Hub-height Wind Speed and Noise Levels", there should be the following reference after the last word, "case" (Cooper 2013).

Page 371. Fourth paragraph under the heading "Correlation of Hub-height Wind Speed and Noise Levels", the reference, "Cooper and Evans 2013" should be replaced by "Cooper 2013".

Page 393. $U_{e,i}$ in Equation (6.43) should be $u_{e,i}$

Page 401. 3 lines above Figure 6.37, change "(4.30)" to "(5.30)"

p521, add the following notes for Equation (C.19). As Equation (C.19) in this form is provided in Attenborough's paper, which uses negative time dependence, the result is actually the complex conjugate of the spherical wave reflection coefficient used in this book. In addition, to be consistent with the use of negative time dependence in Equation

(C.19), it is also necessary to use the complex conjugate of R_p in place of R_p in Equation (C.19).

Page 521. In equations (C.23), (C.24), (C.26) and (C.28), replace ρ/ρ_m^2 with $1/\rho_m^2$.

Page 522. In Equation (C.27), replace $\frac{1}{2}$ with $\frac{1}{\sqrt{2}}$, replace $2k$ with k and change (1−j) to (1+j).

Page 522. In Equation (C.29), −j to +j.

Page 522. Replace Equation (C.31) with the following:
"$g(w) =$" with "$g(w) = g(w_r, \mathrm{j}w_i) = K_1(w_i,\, w_r) + \mathrm{j}K_2(w_i,\, w_r)$".

Page 523. In Equations (C.38) and (C.39), replace "$g(w) =$" with "$g(w) = g(w_r, \mathrm{j}w_i) =$".

Page 523. Immediately following Equation (C.39), add the following text. "The calculation of $g(w)$ in the preceding equations is only valid if the real part of w is less than 0 and the imaginary part is greater than 0 (that is, w is in the second quadrant of the complex plane). So any calculation begins with adjusting the value of w to w_a so that the real part is less than 0 and the imaginary part is greater than 0. As w_a is complex, we can write, $w_a = w_r + \mathrm{j}w_i = \mathrm{Re}\{w_a\} + \mathrm{j}\,\mathrm{Im}\{w_a\}$. The calculation of $g(w_a)$ is then undertaken using Equations (C.30) to (C.39). If the original value of w did not need to be adjusted to put w in the second quadrant of the complex plane, then $g(w) = g(w_a)$. If the original value of w before adjustment, was such that w was not in the second quadrant of the complex plane, then $g(w_a)$ must be adjusted to obtain $g(w)$, according to the following rules, with rule 1 applied first and rule 3 applied to the result after the application of rules 1 and 2.

1. If the imaginary part of w is less than 0, then $g(w_a)$ is replaced with $g(w) = 2\exp(-w_a^2) - g(w_a)$, where $g(w_a)$ is calculated using Equations (C.30) to (C.39);

2. If the imaginary part of w is greater than or equal to 0, then $g(w) = g(w_a)$;

3. If the product of the imaginary and real parts of w is greater than 0, then the sign of the imaginary part of $g(w)$ is changed (i.e., the complex conjugate of $g(w)$ obtained using the preceding two rules is then the final $g(w)$)."

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Page 523. In Equation (C.43), replace $\frac{1}{2}$ with $\frac{1}{\sqrt{2}}$, replace $2k$ with k and change (1−j) to (1+j).

Page 530. In equations (D.23) and (D.24), change $h_{\max}$ to $h'_{\max}$.

Page 531. In the first line, change $h_{\max}$ to $h'_{\max}$.

Page 531. Just before the first full stop on the page, add "($h'_{\max}$ is the maximum height of the ray path above the lower of the source and receiver, whereas $h_{\max}$ shown on Figure D.1 is the height of the ray path above the higher of the source and receiver)."