

Acoustics – A Textbook for Engineers and Scientists

Errata for Volume I

23 July 2018

The following list describes alterations that should be incorporated into Volume I. These corrections are based on inspection of the original November 2017 print version of the book, so some of these corrections might have been incorporated into later revisions. These items consist of errors in the manuscript that was transmitted by me, and errors that were introduced on the course of production, as well as alterations that I believe would clarify the presentation of the topic at hand. Please incorporate these corrections into your own copy. In the event you find an error that is not included in this list, or if you have any suggestions for alterations, please inform me directly at j.h.ginsberg@comcast.net.

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1. Preface page XV, 8th line of the 2nd paragraph: Change “rational” to “rationale”.
2. Page 8, 8th line from top: Change “by” to “to”, so the sentence is “... advanced to the earliest ...”.
3. Page 8, 12th line from top: After “to subtract T ”, insert “from the estimate”, so sentence is “... to subtract T from the estimate to find ...”.
4. Page 14, 5th line after Eq. (1.1.21): Delete carets above P_1 and P_2 . The end of the line should be “...amplitudes P_1 and P_2 ”.
5. Page 32, 6th line after heading for Section 1.3.2: Change first occurrence of “at” to “by”, so the sentence is “... experiments by Fletcher ...”.
6. Page 33, 8th line from top of page: Delete “a” preceding “frequency”. Beginning of line should be “(dB) against frequency. These ...”.
7. Page 51, middle line of first set of equations and first line after second equation: change $P_{\max}$ to $p_{\max}$.
8. Page 52, 7th line after Figure 3: Change “sampling” to “reproducing”.
9. Page 61, 5th line above Example 1.10: Delete last “the”, so that the end of line is: “... being attributable to”.
10. Page 67, 1st line after equation for $KG(\omega_j)$: change “MATLABab” to “MATLAB”.
11. Page 67, 2nd line from bottom: After “`fliplr`”, insert “(flip left right)”, so sentence is “`fliplr` (flip left right) function ...”.
12. Page 70, paragraph preceding “Significance” heading should be shaded. It is part of the problem statement.
13. Page 78, 4 lines after Eq. (1.5.7): End of line should be: “...pink noise, $y = \log_{10}(\alpha) - x$.”
14. Page 99, 1st line after Eq. (2.2.12): change “into” to “from”, so sentence is “... second equation from the first ...”.
15. Page 120, 8th line above Figure 2: Change first “ p_2 ” to “ p_1 ”. Phrase should be “...in which p_1 and p_2 overlap ...”.
16. Page 123, 3rd line of paragraph that begins after Eq. (2.4.23): Change beginning of the line, so it is “at $t = 0$ according to Eq. (2.4.18) is $p(x, 0) = \dots$ ”.
17. Page 132, 1st line after Eq. (2.5.7): Change “as” at end of line to “has”. End of line should be “... $t > 0$, has been”.

18. Page 153, Eq. (2.5.36): Summation range should begin at $n = 1$, that is,

$$p(x, t) \equiv \sum_{\substack{n=1 \\ n \text{ odd}}}^{\infty} \operatorname{Re} \left[2F_n^* \exp \left(\frac{in\pi ct}{2L} \right) \right] \cos \left(\frac{n\pi x}{2L} \right) \quad (2.5.36)$$

19. Page 159, 3rd line before Figure 3: change “advance” to “advanced”.
20. Page 163, 3rd line after Eq. (2.5.55): Replace accent mark above u with an overdot, so the line begins as “ $G_0(x) = R_L F_0(2L - x) = R_L \rho_0 c \dot{u}(-(2L - x)/c)$.”
21. Page 164, 1st line: Replace first two complete sentences. Paragraph should be “significant enhancement of the pressure. The pressure amplitude obtained from their sum fluctuates between $\rho c \dot{u}_{\max}$ and $2\rho c \dot{u}_{\max}$. The oscillation is relative to a mean value that results from u having a nonzero mean.”
22. Page 164, last line: Delete “except”, so sentence is “... this figure, but all ...”.
23. Page 166, 2nd line of statement of Example 2.7: Change “ ζ ” to “ $\zeta \ll 1$ ”.
24. Page 167, 6th line in Part (b): Insert “be” after “to”, so sentence is “... $\dot{u}$ is to be evaluated ...”.
25. Page 169, 12th line after Figure 2: Insert “at” before “38.21 ms”.
26. Page 177, 4th line after first equation: The word “to” is repeated.
27. Page 177, last line in 1st paragraph of the solution: Change “is addressed in the ...” to “is associated with the ...”
28. Page 179, 2nd line after Figure 3: Change sentence to “... to describe propagation of a displacement wave along ...”.
29. Page 195, 2nd line after Eq. (3.1.18): Symbol following B coefficients should be superscript, so sentence is “...is $B^+ \cos(kx)$ or $B^- \sin(kx)$. Thus, ...”.
30. Page 204, 1st line after Figure 1: Change “This” to “The”, so the beginning of the line is “The jump in ...”
31. Page 207, 2nd line after Eq. (3.2.17): Insert a prime after x , so sentence is: “... of increasing x' , so it ...”.
32. Page 213, 3rd line from bottom of page: Replace line with: “The characteristic equation requires that $\exp(2ik_n L)$ equal this product, so all ”
33. Page 216, 6th line from bottom of page: Replace “Any” at beginning of the line with “A harmonic”. Sentence should be “A harmonic pressure field ...”.
34. Page 216, 5th line from bottom of page: Delete second occurrence of “wave”. Sentence should be “... of a pair of oppositely”
35. Page 222, Figure 1: Graph in 1st row, 2nd column: Arrow for $\zeta = 40$ label should point to the solid black curve.
36. Pages 222 and 223, including Figure 1: All ζ appearing here should have a subscript L .
37. Page 228, 9th line from top of page: Change “account ” to “accounting”.
38. Page 228, 2nd line after Eq. (3.3.1): Delete “ κ ”.
39. Page 229, 1st line: Fix typographical marking, so the sentence is “... α are neper/meter, where neper ...”.

40. Page 233, 7th line from top of page: Delete comma after “both”, so line begins as “In both asymptotic ...”
41. Page 235, 1st line after Eq. (3.3.24): Change “in” at the end of the line to “by”, so the end of the line is “... complex wave number is given by”
42. Page 240, 3rd to 4th line after Figure 3.8: Delete “In contrast, ” so sentence is “Viscosity and thermal ...”
43. Page 241, 4th line of the table at bottom of page: Units of k_n are m^{-1} , so first entry is “ k_n (m^{-1})”
44. Page 245, 2nd line after Eq. (3.3.44): Replace “ $k^2 + i\sigma k^{3/2}$ ” with “ $(k')^2$ ” in Eq. (3.3.43).”
45. Page 246, 1st line after first equation: Replace “characteristic impedance” with “reference pressure $\rho_0 c V_0$ ”
46. Page 258, 3rd line from bottom: Change last word from “Three” to “Two”.
47. Page 259, Eq. (3.4.13). Insert minus before cos in 2nd line of the equation for $[D_n]$. It should be

$$[D_n] = \frac{1}{i\rho_n c_n \sin(k_n L_n)} \begin{bmatrix} \cos(k_n L_n) & -1 \\ 1 & -\cos(k_n L_n) \end{bmatrix}$$

48. Page 263, 3rd line after second equation: Delete “an”, so sentence is “... amplitudes in segment n in terms ...”
49. Page 265, Eq. (3.4.39) and following line: Superscript for all P_L should be N , that is, the symbol is $P_L^{(N)}$.
50. Page 284, 7 lines from top: delete “well”, so sentence is ... “, and we set $V_0 = 1$ to ...”.
51. Page 286, 2nd line from top: Delete first word, so beginning of line is: “propagate in arbitrary ...
52. Page 290, Exercise 3.19, 3rd line: Insert “ i ” before “ ω ”, so equation is $p = \text{Re}[(S/r) \exp(-ik'r + i\omega t)]$
53. Page 296, 2nd paragraph, 5th line: Delete commas before and after “that is”.
54. Page 299, 2nd line from bottom: “and” should not be italicized.
55. Page 300, 2nd line after Eq. (4.4.10): Delete “and”. Sentence should be “... observe that x, y, z are the ...”
56. Page 300, Eq. (4.1.11) should be:

$$\bar{v} \cdot \nabla \equiv \frac{dx}{dt} \frac{\partial}{\partial x} + \frac{dy}{dt} \frac{\partial}{\partial y} + \frac{dz}{dt} \frac{\partial}{\partial z} \quad (4.1.11)$$

57. Page 302, 1st line after Eq. (5): Reference should be to Eq. (3), so sentence is “...expressions into Eq. (3) causes ...”.
58. Page 310, 4th line after Eq. (5): Insert phrase at start of sentence following “nonzero.” The line should be “form is nonzero. Selection of this interval could be done by guessing a range of t , then ...”
59. Page 312, Figure 4.4 caption: Delete “a”, so sentence is “...Passage of the $\Theta = 0$ wavefront ...”.
60. Page 317, Eq. (4.3.22): Insert “ P ” after first k^2 , so equation is $\nabla^2 P + k^2 P = \nabla \cdot \nabla \dots$.”
61. Page 319, Eq. (2), 1st line: Replace “10000 B ” with “ $P_B(\bar{\xi}_B)$ ”, so equation is

$$\begin{aligned} P_B(\bar{\xi}_C) &= P_B(\bar{\xi}_B) e^{-ik(\bar{\xi}_C - \bar{\xi}_B) \cdot \bar{e}_B} = 10000 e^{i\Delta} e^{-ik(0.8002\bar{e}_x - 0.50\bar{e}_y) \cdot \bar{e}_B} \\ &= e^{i\Delta} (-7083.1 - 7059.1i) \end{aligned} \quad (2)$$

62. Page 319, 3rd line after Eq. (3): Delete the sentence at the end of the line that begins “This operation”. Replace that sentence with “To that end let us write Eq. (3) as $P = ae^{i\Delta} + b$. Then

$$|P^2| = |a|^2 + |b|^2 + 2 \operatorname{Re}(ab^*e^{i\Delta})$$

This identity leads to”

63. Page 319, 1st equation after Eq. (3): Change “+500” with “−76”, so equation is

$$|P/1000|^2 - 24^2 = -170.51 \cos \Delta + 361.84 \sin \Delta - 76$$

64. Page 325, Eq. (4.5.4): Change $\subset$ to ρ in both places. The equation should be

$$m = (\rho + \delta\rho)(\mathcal{V} + \delta\mathcal{V}) = \rho\mathcal{V} \implies \delta\mathcal{V} = -\frac{\mathcal{V}}{\rho}\delta\rho = -\frac{m}{\rho^2}\delta\rho \quad (4.5.4)$$

65. Page 325, 3rd line from bottom: Replace “ ℓ ” with “/”, so sentence is “... replaced by m/ρ because ...”

66. Page 326, 3rd line above Eq. (4.5.8): Change first “ V ” to script “ $\mathcal{V}$ ”. The sentence should be “... flows into $\mathcal{V}$ across $\mathcal{S}$ plus ...”

67. Page 329, 7th line after Eq. (4.5.18): Insert “the” after “overcome”, so sentence is “... to overcome the elastic ...”

68. Page 331, 2nd paragraph, 1st line: Delete “there”, so sentence begins “Nevertheless, the power ...”.

69. Page 335, Eq. (4.5.39): Insert “ $\bar{e}_r$ ” at end, so equation is “... $|g(r)|^2 \bar{e}_r$ ”.

70. Page 362, 16th line from top of page: Change “... for a plane wave is ...” to “... for a linear plane wave in a homotgeneous fluid is ...”

71. Page 377, 2nd line of the solution: Change end of line to “... point A is $(100/\cos\psi_R)/c = 71.4$ ms.”

72. Page 384, 2nd line after Eq. (5.3.19): Change “grows” to “grow”, so sentence is “... not grow without ...”.

73. Page 406, equation at the botom: Capitalize $\bar{v}_2$, so the equation is “ $V_{\text{gr}} = \bar{V}_2|_{y_2=H_2} \cdot \bar{e}_y = \dots$ ”

74. Page 408, 7th line from bottom: Insert “fluid” before “layer” at end of line, so sentence is “... to a finite fluid layer.”

75. Page 416, 2nd line from bottom: At the end of the line, replace “characterisze fully” with “predict”, so the sentence is “... difficult to predict.”

76. Page 419, 7th line after Porous Barrier heading: Replace “needs” with “need”, so the sentence is “... the barrier need not ...”.

77. Page 445, 1st line after Eq. (6.2.16): Change accent mark above “ F ” to an overdot, so the sentence is “... states that $\dot{F}$ at any ...”.

78. Page 461, 6th line of text above bottom of the page, line beginning with “The sound pressure-”: Insert “at location C ” after “level”, so the sentence is “The sound pressure level at location C due to ...”.

79. Page 471, 1st line above Eq. (6.4.8): Delete “evaluate” at beginning of the line.

80. Page 481, 1st line after Eq. (6.4.43): Delete “in the”, so the sentence is “... minus sign preceding the ...”.

81. Page 488, Eq. (6.4.62): All “ j ” in exponents should be subscript. The equation should be:

$$\mathcal{P} = \frac{1}{2\rho_0 c} \sum_{n=1}^N \sum_{j=1}^N \hat{A}_j^* \hat{A}_n \int_0^\pi \int_{-\pi}^\pi e^{ik(x_j - x_n) \sin \psi \cos \theta} e^{ik(y_j - y_n) \sin \psi \sin \theta} e^{ik(z_j - z_n) \cos \psi} \sin \psi d\theta d\psi \quad (6.4.62)$$

82. Page 497, 3rd line above Eq. (6.4.72): Change “us” to “use”, so the sentence is “...We use a prime ...”.

83. Page 503, Eq. (2): Delete “ k ” in the complex exponential, which should be $e^{-i\vec{r}}$.

84. Page 504, 4th line from bottom: Insert a period, so line reads “...=50,000, is. Results for ...”

85. Page 505, 5th line from bottom: Source should be plural “point sources are a ...”

86. Page 506, 6th line from top: Begin a new sentence after “Fig. 6.8a”, so the end of the line is “... in Fig. 6.8a. We are”

87. Page 511, 2nd line after “Significance” heading: change “qualitative” to “quantitative”.

88. Page 513, 1st line before second equation: Delete “to $\cos \psi$ ”, so line is “... as a function of ψ , where”

89. Page 517, 2nd line after Eq. (6.5.33): Change first word to “than”, so the beginning of the line is “than the radially oscillating ...”.

90. Page 517, Eq. (6.5.36): Insert an overdot above the second occurrence of “ D ”, so the equation is

$$\ddot{D}(\tau) + 2\frac{c}{a}\dot{D}(\tau) + 2\frac{c^2}{a^2}D(\tau) = \dots$$

91. Page 518, 2nd line: Delete “critically”, so the sentence is “... motion for a damped ...”.

92. Page 533, 4th line after Eq. (6.5.61): Change term from “ $\bar{\xi}_n \cdot \nabla$ ” to “ $\bar{\xi}_n \cdot \nabla$ ”, so the sentence is “... the operator $\bar{\xi}_n \cdot \nabla$ by its ...”

93. Page 534: Delete sentence after Eq. (6.5.65).

94. Page 534, Eq. (6.5.66): There are several typographical errors. It should be

$$P_{\text{ff}} = \left[\hat{A} + ik \sum_{j=1}^3 D_j \frac{x_j}{r} - k^2 \sum_{j=1}^3 \sum_{m=j}^3 Q_{jm} \frac{x_j x_m}{r^2} + \dots \right] \left(\frac{e^{-ikr}}{r} \right) \quad (6.5.66)$$

95. Page 542, 3rd paragraph beginning with “The fluid is stationary. ”, 6th line. Delete first occurrence of “maximum”. Sentence should be “... emits the second sphere of maximum”

96. Page 544, 1st line after Eq. (6.6.14): Delete “relative”. Sentence should be “... unit vector for the ...”

97. Page 545, Eq. (6.6.18): Delete “ $\nabla \tau$ ” to the left of the identity sign at the beginning of second line.

98. Page 545, 7th line above statement of Example 6.13: Delete first “the”. The sentence should be “... replaced by a different ...”

99. Page 548, 7th line from bottom of the page: Change “casem” to “case”.

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