Errata for Acoustics: Sound Fields and Transducers by Leo Beranek & Tim Mellow, Jan 2017 to August 2017.

Updated January 24, 2024

P. 38: Replace Eq. (2.56) with $\Gamma = \dfrac{\tilde{p}_+}{\tilde{p}_-} = \dfrac{Z_T - \rho_0 c}{Z_T + \rho_0 c}$.

P. 38: Replace Eq. (2.57) with $SWR = \dfrac{1 + |\Gamma|}{1 - |\Gamma|}$.

P. 39, 2nd column of Table 2.1: Replace $\begin{matrix} 0 \\ 0 \\ -1 \\ 2 \end{matrix}$ with $\begin{matrix} 0 \\ \infty \\ -1 \\ 0 \end{matrix}$.

P. 47, 1st line: Replace "Sec. 6.6" with "Section 7.6".

P. 47, Last line before Heading 2.6: Replace "Secs. 3.22 and 3.23" with "Sections 4.22 and 4.23".

P. 52, Eq. (2.109): Replace "s" or "*rayls*" with "rayls".

P. 55, 6th line after Eq. (2.115): Replace "three equations for each ordinate as follows" with "three equations, one for each ordinate as follows"

P. 57, 1st line: Replace "$W_n(w)\Phi(\phi)Z(z)$" with "$W_n(w)\Phi_n(\phi)Z(z)$".

P. 62, Eqs. (2.163) and (2.164): Exchange "$h_n^{(1)}$" and "$h_n^{(2)}$".

P. 81, 2nd line from top: Replace "$Y_M = \dfrac{\tilde{u}}{\tilde{f}} + \dfrac{\tilde{u}}{\tilde{f}_1 + \tilde{f}_2}$" with "$Y_M = \dfrac{\tilde{u}}{\tilde{f}} = \dfrac{\tilde{u}}{\tilde{f}_1 + \tilde{f}_2}$".

P. 97, 4th line from bottom: Between "permittivity of the" and "piezoelectric dielectric" insert "free (non-blocked)".

P. 97: At end of 3rd line from bottom add "with electrical short-circuited".

P. 99, 4th line of last paragraph: Replace "driving force blocked" with "motion blocked".

P. 100, Eqs. (3.39a) to (3.40b): Replace "d_{33}" with "d_{31}".

P. 102, Example 3.6: Replace "1.414 T" with "1.414 T·m"

P. 104, Example 3.8: Replace "acoustic impedance of $300 + j300$ N·s/m^5" with "acoustic impedance of $(300 + j300)$ N·s/m^5" and replace "$= 1.92 + 1.92$ Ns/m" with "$= (1.92 + j1.92)$ N·s/m".

P. 106, Caption to Fig. 3.42: Replace "Fig. 3.40" with "Fig. 3.41".

P. 121, after Eq. (4.2), replace "If $\ell' < 16$, the second term" with "If $\ell' < \lambda/16$, the second term".

P. 121, 1st line after heading 4.3: Replace "$(\ell = 0)$" with "$(x = 0)$".

P. 129, in Eq. (4.24): Replace "kg/m^2" with "kg/m^4".

P. 130, caption to Fig. 4.8: Replace "length l" with "length t".

P. 139, 9th line after Heading 4.10: Replace "$\tilde{p}_+$" with "$\tilde{A}_+$".

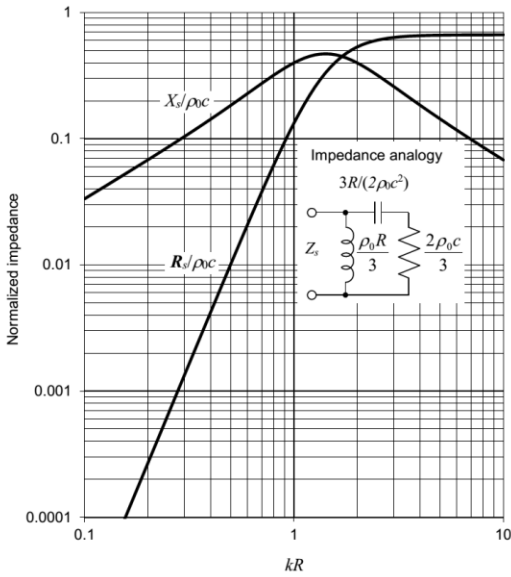P. 140, Eq. (4.70): Replace "$\boldsymbol{R}_s$" with "$\boldsymbol{R}_M$".

P. 161: Replace Eq. (4.136) with

$$\tilde{F} = 2R^2 \int_0^{2\pi} \int_0^{\pi/2} \tilde{p}(R,\theta)\cos\theta \sin\theta \, d\theta \, d\varphi$$

$$= \rho_0 c \tilde{U}_0 \frac{2}{3} \cdot \frac{jkR(1 + jkR)}{2 - k^2 R^2 + 2jkR} e^{-jkR}.$$

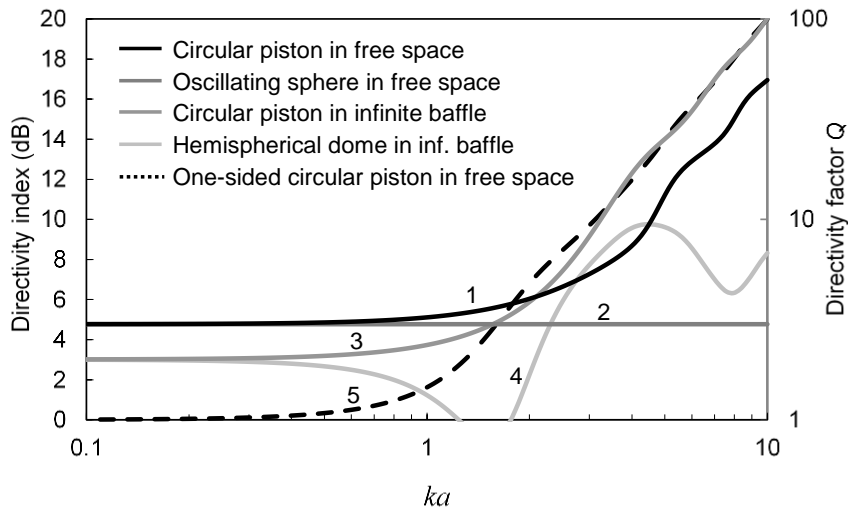P. 161: Replace equation Eq. (4.137) with

$$Z_s = R_s + jX_s = \frac{\tilde{F}}{\tilde{U}_0 e^{-jkR}}$$

$$= \frac{2}{3} \cdot \frac{jkR(1 + jkR)}{2 - k^2 R^2 + 2jkR} \rho_0 c$$

$$= \frac{2}{3} \cdot \frac{k^4 R^4 + j(k^3 R^3 + 2kR)}{k^4 R^4 + 4} \rho_0 c.$$
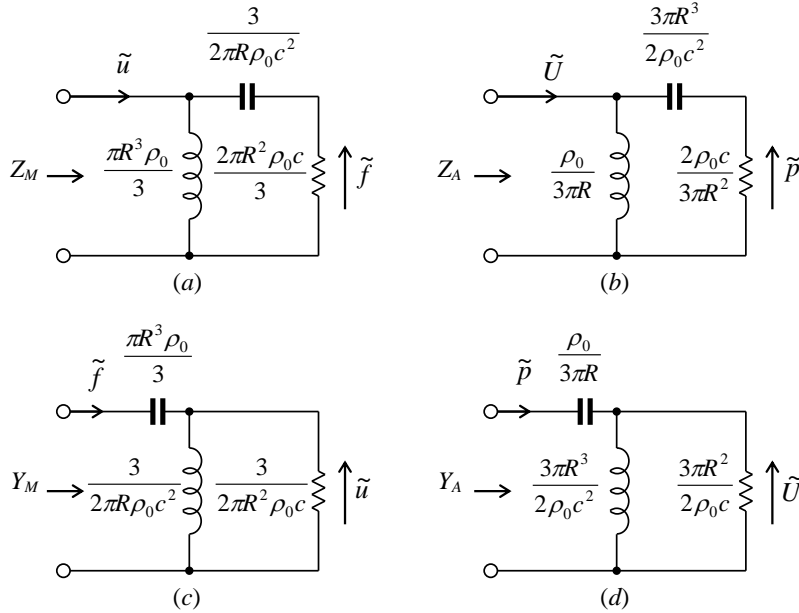
P. 162, Replace Fig. 4.27 with

P. 166, Replace Fig. 4.30 with

P. 166, Add to caption of Fig. 4.30 "These are plotted using Eq. (4.143), which is divided by 2 in the case of the piston and oscillating sphere in free space because they radiate from both sides and hence radiate twice the power.

P. 170, Replace Fig. 4.34 with

(a) $Z_M \rightarrow$; input $\tilde{u}$; series capacitor $\dfrac{3}{2\pi R\rho_0 c^2}$; shunt inductor $\dfrac{\pi R^3 \rho_0}{3}$; shunt resistor $\dfrac{2\pi R^2 \rho_0 c}{3}$; output $\tilde{f}$

(b) $Z_A \rightarrow$; input $\tilde{U}$; series capacitor $\dfrac{3\pi R^3}{2\rho_0 c^2}$; shunt inductor $\dfrac{\rho_0}{3\pi R}$; shunt resistor $\dfrac{2\rho_0 c}{3\pi R^2}$; output $\tilde{p}$

(c) $Y_M \rightarrow$; input $\tilde{f}$; series capacitor $\dfrac{\pi R^3 \rho_0}{3}$; shunt inductor $\dfrac{3}{2\pi R\rho_0 c^2}$; shunt resistor $\dfrac{3}{2\pi R^2 \rho_0 c}$; output $\tilde{u}$

(d) $Y_A \rightarrow$; input $\tilde{p}$; series capacitor $\dfrac{\rho_0}{3\pi R}$; shunt inductor $\dfrac{3\pi R^3}{2\rho_0 c^2}$; shunt resistor $\dfrac{3\pi R^2}{2\rho_0 c}$; output $\tilde{U}$

P. 175, 3rd line after heading 4.20: Replace "Eqs. (12.249), (12.250), and (12.251)" with "Eqs. (13.248), (13.249), and (13.250)".

P. 176, In 5th and 10th rows of Table 4.5: Replace "Resistance R" and "Conductance G" with "Resistance R, R_2" and "Conductance G, G_2" respectively.

P. 179, 4th row of Table 4.6: Replace " $R_{S2} = \pi a^2 \rho_0 c$ $\quad R_{S2} = \rho_0 c$ $\quad R_{S2} = \dfrac{\rho_0 c}{\pi a^2}$ "

with " $R_{M2} = \pi a^2 \rho_0 c$ $\quad R_{S2} = \rho_0 c$ $\quad R_{A2} = \dfrac{\rho_0 c}{\pi a^2}$ ".

P. 187, Eq. (4.227): Replace both instances of "z_{11}" with "$z_{11} - z_{12}$".

P. 187, Eq. (4.228) and P. 188, Eq. (4.229): Replace "I" with "1".

P. 194, Between Eqs. (4.253) and (4.254), in Eq. (4.254) and 1st line after Eq. (2.54): Replace "δ_V" with "δ_{visc}".P. 211, End of 1st paragraph: Replace "Chapter 6" with "Chapter 7".

P. 198, 1st line after Eq. (4.263): Replace "(6×10^7)" with "(6×10^6)".

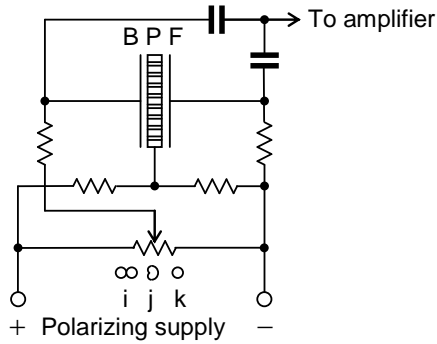P. 211, Last line of 1st paragraph: Replace "Chapter 6" with "Chapter 7".

P.216, Fig. 5.18 (a): Replace " $\tilde{\eta}(w) \updownarrow$ " with " $\downarrow \eta$ "

P. 219, Eq. (5.40): Replace " $\tilde{e}$ " with " $-\tilde{e}$ ".

P. 220, Figs. 5.20 and 5.21: Replace " $\uparrow\tilde{e}$ " with " $\downarrow\tilde{e}$ ".

P. 231: Replace Fig 5.31 with

P. 236, 2nd line after Eq. (5.95): Replace "Fig. 533" with "Fig. 5.34".

P. 239, Table 5.2, 2nd column: Replace "D" with "d".

P. 269: Replace Eq. (6.90) with

$$E_{ff} \approx 100 \frac{2B^2 S_D^2 \rho_0}{\pi^2 \kappa \rho_w^2 V_g c}, \qquad 2f_0 < f < \frac{c}{4\pi a}, \qquad M'_{MS} \approx M_{MC}$$

P. 305, last sentence before Eq. (7.9): Replace "total volume the absorbent" with "total volume of the absorbent".

P. 306: Delete "α is the real part of the propagation coefficient".

P. 306: Delete "β is the imaginary part of the propagation coefficient".

P. 306, 5th line from end of last paragraph: Replace "bass-will reflex" with "bass-reflex".

P. 313, Eqs. (7.36) and (7.37): Replace "=" with "≈".

P. 314, Eqs. (7.38) and (7.39): Replace "=" with "≈".

P. 314, Replace Eq. (7.38) with

$$D(0) = \frac{1 - 2(ka/\sqrt{5})^2 + j2(ka/\sqrt{5})}{1 - (ka/\sqrt{5})^2 + j(ka/\sqrt{5})}$$

P. 314, Replace Eq. (7.39) with

$$|p(r)| = \frac{f\rho_0 |U_c|}{2r} \sqrt{\frac{(5\text{-}2k^2 a^2)^2 + 20k^2 a^2}{(5\text{-}k^2 a^2)^2 + 5k^2 a^2}}.$$

P.337, After Eq. (7.85): Replace "$\omega_S^2 = P_4 / \omega_B^2$" with "$\omega_S^2 = P_0 / \omega_B^2$".

P. 356: Replace Eq. (7.119) with

$$\tilde{u}_z(x,y,l_z) = \frac{2}{k}\tilde{u}_0 \sum_{m=0}^{\infty}\sum_{n=0}^{\infty} k_{mn} A_{mn} \frac{k\rho_0 c \cos k_{mn} l_z + j k_{mn} Z_s \sin k_{mn} l_z}{k\rho_0 c - k_{mn} Z_s}$$

$$\times \int_0^{l_x} \cos(m\pi x/l_x)\cos(p\pi x/l_x)dx \int_0^{l_y} \cos(n\pi y/l_y)\cos(q\pi y/l_y)dy$$

$$= \tilde{u}_0 \int_{(l_x-a_1)/2}^{(l_x+a_1)/2} \cos(p\pi x/l_x)dx \int_{y_1-b_1/2}^{y_1+b_1/2} \cos(q\pi y/l_y)dy$$

P. 360, 4th line after "Summary of transmission-line design": Replace "acts as a high-pass filter" with "acts as a low-pass filter".

P. 381, 2nd line after Eq. (7.171): Replace "frequency f_0 if *below*" with "frequency f_0 is *below*".

P. 399, final paragraph: Replace "The circuit for an electret microphone shown in Fig. 8.7 is much simpler than that for an externally polarized microphone, shown in Fig. 5.18, because the electret provides both the polarization for the capsule and the bias for the FET." with "The circuit for an electret microphone shown in Fig. 8.7 is simpler than that for an externally polarized microphone, shown in Fig. 5.18, because the electret provides the polarization for the capsule, although the bias for the FET usually settles to zero due to leakage."

P. 445, equation preceding heading "6. *Horn*": Replace "4.99×10^{-12}" with "9.99×10^{-12}".
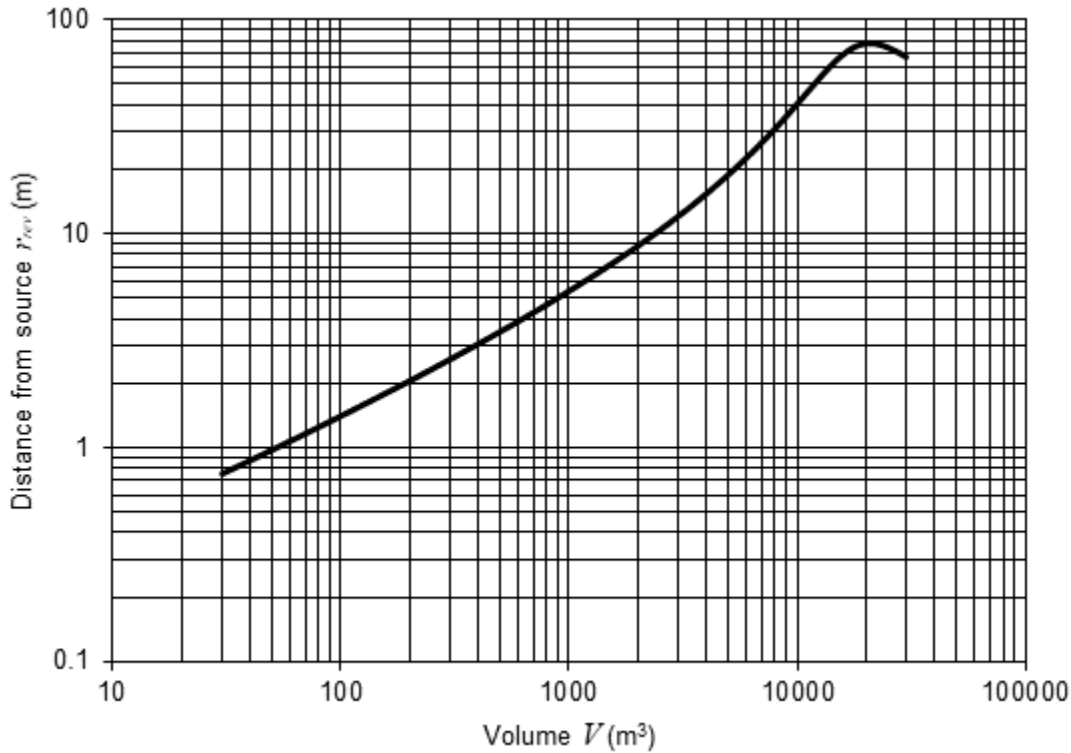
P. 446: Replace equation for S_T with

$$S_T = 4R_T^2 \left\{ \arctan\left(\frac{\tan\frac{\pi}{12}\tan\frac{\pi}{6}}{\sec^2\frac{\pi}{12} + \sqrt{\sec^2\frac{\pi}{12}+\tan^2\frac{\pi}{6}}}\right) + \arctan\left(\frac{\tan\frac{\pi}{12}\tan\frac{\pi}{6}}{\sec^2\frac{\pi}{6} + \sqrt{\sec^2\frac{\pi}{6}+\tan^2\frac{\pi}{12}}}\right) \right\}$$

$$= 4 \times 0.022^2 \times 0.13 = 2.52\,\text{cm}^2$$

P. 459, Eq. (10.23): Replace "$\dfrac{n\pi c}{1/\sqrt{\gamma}}$" with "$\dfrac{n\pi c}{l\sqrt{\gamma}}$".

P. 461, Eq. (10.33): Replace "$\dfrac{n\pi c}{1/\sqrt{\gamma}}$" with "$\dfrac{n\pi c}{l\sqrt{\gamma}}$".

P. 470, Eqs. (10.45) and (10.46): Replace "cs" with "cS".

P. 477: Replace Fig. 10.16 with

P. 477: Replace Eq. (10.70) with $\alpha_{tot} = \dfrac{0.161V}{S_{tot}T}$, $\quad \alpha_{ey} = 1 - e^{-0.161V/(S_{tot}T)}$

P. 491, 3rd line after Eq. (12.17): Replace "$\cos\theta = Z/\sqrt{w^2 + Z^2}$" with "$\cos\theta = z/\sqrt{w^2 + z^2}$".

P.493, Fig. 12.5: Exchange "$D(\pi)$" and "$D(0)$".

P. 494, 2nd line after Eq. (12.24): Replace "Eq. (13.68)" with "Eq. (13.62)".

P. 497, 1st line after Eq. (12.35): Replace "$D(r, \theta)$" with "$D(\theta)$".

P.498, Fig. 12.10: Exchange "$D(\pi)$" and "$D(0)$".

P.499, Fig. 12.11: Exchange "$D(\pi)$" and "$D(0)$".

P. 501, Eq. (12.45): Replace "e^{jkr}" with "e^{-jkr}".

P. 501, 1st line after Eq. (12.46): Replace "$20\log_{10}(D(\theta)/D(0))$" with "$20\log_{10}(|D(\theta)|/|D(0)|)$".

P. 503, Caption to Fig. 12.15 and 1st line after Eq. (12.47): Replace "$20\log_{10}(D(0))$" with "$20\log_{10}|D(0)|$" and replace "$20\log_{10}(D(\pi))$" with "$20\log_{10}|D(\pi)|$".

P. 503, 4th line after Heading 12.6: Replace "the next problem" with "Section 12.8".

P. 504, after Eq. (12.51): Insert "of Eq. (2.4a)" between "condition" and "gives".

P. 505, Eq. (12.57), Replace "ρ" with "ρ_0".

P. 506, Eq. (12.60), Replace first instance of "$(2n + 1)$" with "$(2n + 2)$".

P. 506, last line before Fig. 12.17: Replace "$20\log_{10}(D(\theta)/D(0))$" with "$20\log_{10}(|D(\theta)|/|D(0)|)$".

P. 507, 1st line after Eq. (12.61) and caption to Fig. 12.18: Replace "$20\log_{10}(D(0))$" with "$20\log_{10}|D(0)|$".

P. 507, Replace Eq. (12.62) with

$$\tilde{F} = R^2 \int\limits_{0}^{2\pi}\int\limits_{0}^{\alpha} \tilde{p}(R,\theta)\cos\theta\sin\theta d\theta d\phi$$

P. 508, Replace Eq. (12.63) with

$$Z_s = \frac{\tilde{F}}{\tilde{U}_0} = j\rho_0 c\left(\frac{\sin^2\alpha\ h_0^{(2)}(kR)}{4h_1^{(2)}(kR)} - \frac{(1-\cos^3\alpha)^2 h_1^{(2)}(kR)}{\sin^2\alpha\ \left(h_0^{(2)}(kR) - 2h_2^{(2)}(kR)\right)} \right.$$
$$\left. -\sum_{n=2}^{\infty} \frac{(2n+1)^2\left(\sin\alpha\ P_n(\cos\alpha) + \cos\alpha\ P_n^1(\cos\alpha)\right)^2 h_n^{(2)}(kR)}{(n-1)^2(n+2)^2\left(nh_{n-1}^{(2)}(kR) - (n+1)h_{n+1}^{(2)}(kR)\right)} \right)$$

P. 508, Replace "When $\alpha = \frac{1}{2}\pi$, the second term simplifies to that for an oscillating sphere, as described in Par. 4.15, and the expansion vanishes so that Eq. (12.63) simplifies to" with "When $\alpha = \frac{1}{2}\pi$, the odd terms of the expansion vanish, except for the second term, which simplifies to that for an oscillating sphere, as described in Sec. 4.15. Hence, Eq. (12.63) simplifies to"

P. 508: Replace Eq. (12.64) with

$$Z_s\Big|_{\alpha=\frac{\pi}{2}} = \rho_0 c\left(\frac{k^4 R^4 + j(k^3 R^3 + 2kR)}{3(k^4 R^4 + 4)} - j\sum_{n=0}^{\infty} \frac{(4n+1)^2\left(P_{2n}(0)\right)^2 h_{2n}^{(2)}(kR)}{(2n-1)^2(2n+2)^2\left(2nh_{2n-1}^{(2)}(kR) - (2n+1)h_{2n+1}^{(2)}(kR)\right)} \right)$$

P. 513, 1st line after Eq. (12.85): Replace "$20\log_{10}(D(0,0))$" with "$20\log_{10}|D(0,0)|$".

P. 514, Caption to Fig. 12.21: Replace "$20\log_{10}(D(0,0))$" with "$20\log_{10}|D(0,0)|$".

P. 516: Replace Eq. (12.92) with $\tilde{u}_r(R,\theta) = \frac{1}{-jk\rho_0 c}\cdot\frac{\partial}{\partial r}\tilde{p}(r,\theta)\big|_{r=R} = 0, \quad \alpha < \theta \leq \pi, \quad r = R$

P. 518, 1st line after Eq. (12.111): Replace "$20\log_{10}(D(\theta)/D(0))$" with "$20\log_{10}(|D(\theta)|/|D(0)|)$".

P. 518, 1st line after Eq. (12.112): Replace "$20\log_{10}(D(0))$" with "$20\log_{10}|D(0)|$".

P. 519, Caption to Fig. 12.24: Replace "$20\log_{10}(D(0))$" with "$20\log_{10}|D(0)|$".

P. 521, Eq. (12.118), Replace " $p(r,\theta)$ " with " $\tilde{p}(r,\theta)$ ".

P. 523, Eq. (12.130), Replace " $P_m^1(\alpha)$ " with " $P_m^1(\cos\alpha)$ ".

P. 523, Eq. (12.133), Delete "j" from the denominator.

P. 524, Eq. (12.138): Replace "$(2n-1)(2n+1)$" with "$(2n-1)(2n+2)$".

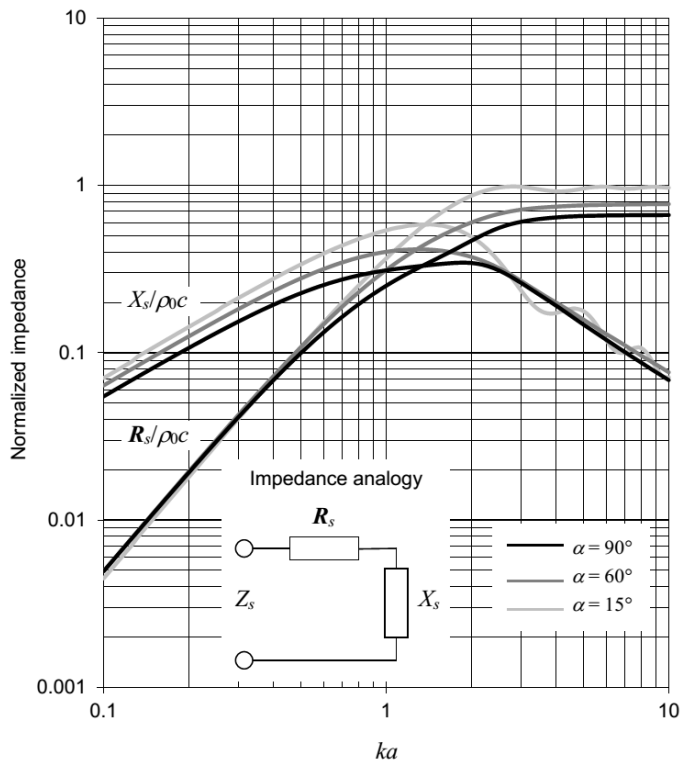P. 524, 1st line after Eq. (12.138): Replace "$20\log_{10}(D(\theta)/D(0))$" with "$20\log_{10}(|D(\theta)|/|D(0)|)$".

P. 525, Caption to Fig. 12.28 and 1st line after Eq. (12.139): Replace "$20\log_{10}(D(0))$" with "$20\log_{10}|D(0)|$".

P. 525, Replace Eq. (12.140) with $\tilde{F} = R^2 \int_0^{2\pi} \int_0^{\alpha} \tilde{p}(R,\theta) \cos\theta \sin\theta \, d\theta \, d\phi$.

P. 525, Replace Eq. (12.141) with $Z_s = \dfrac{\tilde{F}}{\tilde{U}_0} = \dfrac{2\rho_0 c}{\sin^2 \alpha} \sum_{n=0}^{N} A_n h_n^{(2)}(kR) K_n$.

P. 526, Replace Fig. 12.29 with

P. 527, Eq. (12.144), Replace " $p(r,\theta)$ " with " $\tilde{p}(r,\theta)$ ".

P. 527, Eq. (12.145), Replace " $\tilde{p}_l$ " with " $\tilde{p}_I$ ".

P. 529, Eq. (12.161): Replace " $P_n(\cos\alpha)P_m(\cos\alpha) - P_m(\cos\alpha)P_n(\cos\alpha)$ " with

" $P_m(\cos\alpha)P_n'(\cos\alpha) - P_n(\cos\alpha)P_m'(\cos\alpha)$ ".

P. 531, 1st line after Eq. (12.167): Replace "20log$_{10}$($D(\theta)/D(0)$)" with "20log$_{10}$(|$D(\theta)$|/|$D(0)$|)".
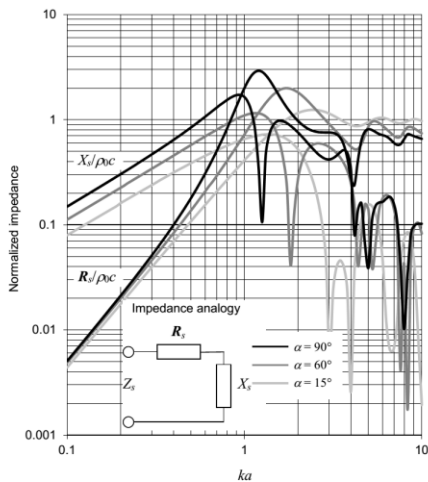
P. 531, 1st line after Eq. (12.168) and caption to Fig. 12.32: Replace "20log$_{10}$($D(0)$)" with "20log$_{10}$|$D(0)$|".

P. 532, Replace Eq. (12.169) with $\tilde{F} = R^2 \int_0^{2\pi} \int_0^{\alpha} \tilde{p}(R,\theta)\cos\theta \sin\theta \, d\theta \, d\phi$.

P. 532, 1st line after Eq. (12.169): Replace "Eq. (69)" with "Eq. (68)".

P. 532, Replace Eq. (12.170) with $Z_s = \dfrac{\tilde{F}}{\tilde{U}_0} = \dfrac{2\rho_0 c}{\sin^2 \alpha} \sum_{n=0}^{N} y_n j_n(kR)L_n$.

P. 532, Replace Fig. 12.33 with

P. 542, 4th line from top: Replace "waves are converging" with "waves converge towards them".

P. 542, 14th line after Eq. (13.34): Replace "Sec. 13.20" with "Sec. 13.19".

P. 542, 4th line from bottom: Replace "non-integral" with "Euclidean".

P. 542, 3rd line from bottom: Replace both instances of "integral" with "Fourier".

P. 543, 1st line after Eq. (13.40): Replace "an integral" with "a Fourier".

P. 545, 2nd line after Eq. (13.49): Replace "non-integral" with "Euclidean".

P. 545, 2nd line after Eq. (13.52): Replace "integral" with "Fourier".

P. 545, 3rd line after Eq. (13.52): Replace "$k_y = k_w \cos \varphi$" with "$k_y = k_w \sin \varphi$".

P. 546, last line: Replace "non-integral" with "Euclidean".

P. 553, 4th line before *Boundary conditions*: Replace "non-integral" with "Euclidean".

P. 553, 2nd line before *Boundary conditions*: Replace "integral" with "Fourier".

P. 555, Eq. (13.100): After "=" insert "–".

P. 555, Eq. (13.101): After "=" delete "–".

P. 556, In caption to Fig. 13.5: Replace "ω" with "$2\pi fa$".

P. 556, Eq. (13.104): After "=" delete "–".

P. 557, Eq. (13.106): Replace "$\dfrac{k^2 a^2}{4}$" with "$-\dfrac{k^2 a^2}{4}$".

P. 563, Eq. (13.125): After "=" delete "–".

P. 564, In caption to Fig. 13.9: Replace "ω" with "$2\pi fa$".

P. 564, Eq. (13.130): After "=", delete "–".

P. 565, In Eq. (13.131): Delete "2".

P. 566, 1st line after Eq. (13.141): Replace "integral" with "Fourier".

P. 576: Replace 3rd equation from top with "$D(0) = ka\rho_0 c(G_S + jB_S)$".

P. 576, caption to Fig. 13.15: Replace "Plot of $20 \log_{10}(D(0))$" with "Plot of $20 \log_{10}(\pi |D(0)|/4)$"

P. 577, In caption to Fig. 13.16: Replace "ω" with "$2\pi fa$".

P. 578, Eq. (13.184): Replace "$\dfrac{k^2 a^2}{4}$" with "$-\dfrac{k^2 a^2}{4}$".

P. 580, Eq. (13.192): Insert "=" just before "$G_s + jB_s$".

P. 581, Eq. (13.196): Replace "$-j\dfrac{G_s}{G_s^2 + B_s^2}$" with "$-j\dfrac{B_s}{G_s^2 + B_s^2}$".

P. 586, Eqs. (13.219) and (13.221): Replace "+" with "–" and replace "N" with "∞".

P. 587, Eq. (13.232): Replace "$-j$" with "$+j$".

P. 588, Eqs. (13.234) and (13.237): After "=" delete "–".

P. 590, In caption to Fig. 13.23: Replace "ω" with "$2\pi fa$".

P. 591, In captions to Fig. 13.24: Replace "ω" with "$2\pi fa$".

P. 599, In caption to Figs. 13.31 & 13.32: Replace "ω" with "$2\pi fa$".

P. 605, Eq. (13.258): Replace "i" with "j".

P. 606, Eq. (13.260): Replace "i" with "j".

P. 607, Eq. (13.265): Replace "i" with "j".

P. 609, Eqs. (13.267) and (13.268): Replace "i" with "j".

P. 610. 1st line: Replace "impedance" with "resistance".

P. 619, after Eq. (13.318): Replace "θ_1 is the angle between the normal to the surface of the piston and the projection of the line joining the middle of the surface and the observation point on the plane normal to the surface and parallel to d_1. θ_2 is the same as θ_1 with d_2 substituted for d_1." with "θ_1 is the angle between the line joining the middle of the surface of the piston to the observation point and the projection of this line on the plane normal to the surface and parallel to d_2. θ_2 is the same as θ_1 with d_1 substituted for d_2."

P. 621, Eqs. (13.328) and (13.329): Replace "$g_{m,n}(q)$" with "$g_{m,n}$".

P. 623, Eq. (13.334): Replace "$J_1(ka)$" with "$J_1(2ka)$" and "$\mathbf{H}_1(ka)$" with "$\mathbf{H}_1(2ka)$".

P. 627, 3rd line before Eq. (13.342): Replace "integral" with "Fourier".

P. 652, 2nd line after heading 14.10: Replace "current sources" with "a current source".

P. 667, Eq. (14.164): Replace " $\tilde{i}_{T1P}$ "," $\tilde{i}_{T1S}$ "," $\tilde{i}_{G1P}$ ", and " $\tilde{i}_{G1S}$ " with " $\tilde{i}_{VV1S}$ "," $\tilde{i}_{CC1S}$ "," $\tilde{i}_{VC1S}$ ", and " $\tilde{i}_{VC2S}$ " respectively.

P. 680, Eq. (70): Replace "$m(m + 1) - n(n + 1)$" with "$n(n + 1) - m(m + 1)$".

P. 682, Eq. (87): Replace "$\dfrac{\Gamma(\nu)}{\pi}\left(\dfrac{z}{2}\right)^{\nu}$" with "$-\dfrac{\Gamma(\nu)}{\pi}\left(\dfrac{2}{z}\right)^{\nu}$"

P. 684, Eq. (101): Replace "$\alpha_{km}\; n\; \alpha_{kn}$" with "$\alpha_{km} \neq \alpha_{kn}$".

P. 684, Eq. (102): Replace "α_m" with "α_{km}" and "α_n" with "α_{kn}".

P. 684, Eq. (108): Replace " $J_0\left(z\sqrt{1-t^2}\right)2$ " with " $J_0\left(z\sqrt{1-t^2}\right)=$ ".

P. 685, Eq. (110): Insert "2" before summation sign.

P. 688, Eq. (152): Replace "x" with "z".

P. 384, Replace Eq. (7.179) with

$$f_0 = \sqrt{5}c/(2\pi a)$$

After "=" insert "−" in Eqs. (4.116), (4.134), (4.135), (12.30), (12.33), (12.34), (12.46), (13.13), (13.105), (13.160), (13.177), and (13.181).

After "=" delete "−" in Eqs. (4.64), (4.65), (4.67), (4.71), (4.72), (4,75), (4.110), (4.112), (4.114), (4.117), (4.118), (4.125), (4.126), (4.127), (4,129), (4.130), (4.132), (4.133), (6.31), (6.32), (6.36), (12.24), (12.25), (12.45), (13.2), (13.11), (13.12), (13.87), (13.89), (13.91), (13.92), (13.178), (13.184), (13.204), (13.206), (13.215), (13.222), (13.227), (13.230), (13.231), (13.232), (13.247), and (13.269).

P. 385-386: Replace Example 7.4 with the following simpler corrected version:

Example 7.4. Crossover for woofer of Example 7.2. In this example we shall implement a 3rd-order Butterworth high-pass filter using a series capacitor for the 1st-order section and the native response of the tweeter for the 2nd-order section. Because the tweeter will be mounted in a sphere, we shall design a crossover to compensate for the 6 dB lift associated with a point source in a sphere (see Fig. 7.14) so that it provides part of the 1st-order section. The low-pass section will be designed to give an all-pass overall response with zero phase shift, as discussed in the previous section. Hence the low-pass section will use just a series inductor together with the 6 dB lift due to the baffle effect, using a closed-back piston as a model (see Fig. 7.15). Since the woofer occupies almost the full width of the box, we will take a as 9.4 cm which, using Eq. (7.179), gives us a crossover frequency of

$$f_0 = 2.24 \times 344.8/(2 \times 3.14 \times 0.094) = 1305 \text{ Hz}$$

Hence the value of the series inductance needed is

$$L_1 = \frac{R_E}{2\pi f_0} = \frac{6.27}{2 \times 3.14 \times 1305} = 0.766 \text{ mH}$$

However, the coil inductance is 0.71 mH, so to make up the difference we will use an inductor with a value of $0.766 - 0.71 = 56$ μH. Next we need to choose a tweeter suitable for a crossover frequency of 1305 Hz. The SEAS model 27TFF (H0831) has a resonance frequency of $f_C = 1200$ Hz, which is close enough. The effective area of the dome is $S_D = 7.5$ cm^2. The maximum sound pressure of the woofer has already been specified as 99.6 dB SPL at a distance of $r = 1$ m. At the crossover frequency f_0, the sound pressure produced by the tweeter is 3 dB less than this, that is 96.6 dB SPL, and decreases at a rate of 18 dB/octave below f_0. The peak displacement at f_0 is obtained from Eq. (6.35) to give

$$\eta_{\text{peak}} = \frac{\sqrt{2}r \times 10^{\frac{\text{SPL}}{20}-5}}{\pi f^2 \rho_0 S_D} = \frac{1.414 \times 1 \times 10^{\frac{96.6}{20}-5}}{3.14 \times 1305^2 \times 1.18 \times 7.5 \times 10^{-4}} = 0.2 \text{ mm}$$

which is within the linear excursion limit of 0.5 mm and at frequencies above and below f_0 the displacement is reduced. Using the method described in Sec. 6.10 for measuring the Thiele-Small parameters, we estimate the Q factors from the impedance curve to be

$$Q_{EC} = \omega_S M_{MD} R_{ES}/(Bl)^2 = 2\pi \times 1200 \times 0.0003 \times 4.8/3.5^2 = 0.89$$

$$Q_{MC} = \omega_S M_{MD} R_E/(Bl)^2 = 2\pi \times 1200 \times 0.0003 \times 10.2/3.5^2 = 1.88$$

Also, the quoted sensitivity is 92 dB SPL in a baffle at 1 m with an input voltage of 2.83 Vrms (or 86 dB SPL in free space). However, the woofer has a sensitivity of 79.6 dB SPL in free space, so the tweeter needs a series resistor to match its sensitivity to that of the woofer. If $R_E = 4.8\ \Omega$, then the series resistor value is

$$R_1 = R_E (10^{(TweeterSensitivity-WooferSensitivity)/20} - 1)$$
$$= 4.8 \times (10^{(92-79.6)/20} - 1) = 15.2\ \Omega \approx 15\ \Omega$$

This will modify the values of Q_{EC} and Q_{TC} as follows

$$Q'_{EC} = \left(1 + \frac{R_1}{R_E}\right) Q_{EC} = \left(1 + \frac{15}{4.8}\right) \times 0.89 = 3.67$$

$$Q'_{TC} = Q'_{EC} Q_{MC} /(Q'_{EC} + Q_{MC}) = 1.24$$

which is close enough to unity for a 3rd-order Butterworth response. We need to correct for the 6 dB lift in the response of the tweeter due to the baffle effect. We will simplify this by mounting the tweeter on a wooden sphere so that we can model it as a point source on a sphere of radius R. Then the transfer function of the point source on a sphere from Eq. (7.36) (producing a 6 dB lift) provides the shelf filter response

$$\frac{s + c/R}{s + 2c/R} = \frac{s + \omega_E}{s + \omega_0}$$

where the radius of the sphere is given by

$$R = 2c/\omega_0 = 344.8/(3.14 \times 1305) = 84.1\ mm$$

Thus the 6 dB transition takes place between $f_E = f_0/2 = 1305/2 = 653$ Hz and $f_0 = 1305$ Hz with a 1st-order slope. Hence we need the series capacitor to continue the 1st-order slope from f_E downwards and its value is determined by

$$C_1 = \frac{1}{2\pi f_E (R_E + R_1)} = \frac{1}{2 \times 3.14 \times 653 \times (4.8 + 15)} = 12.3\ \mu F \approx 12\ \mu F$$

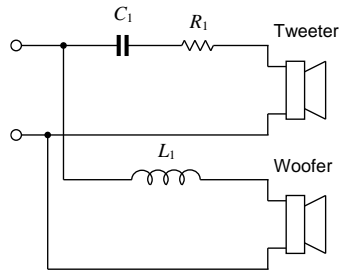The network is shown in Fig. 7.51.

P. 386: Replace Figure 7.51 with:

Fig. 7.51. Crossover network of Example 7.4 with a crossover frequency of $f_0 = 1305$ Hz. The values of the crossover circuit elements are $R_1 = 15\ \Omega$ (25 W), $L_1 = 56\ \mu H$, and $C_1 = 12\ \mu F$. The woofer is a Bandor type 100DW/8A mounted in a closed-box baffle as described in Example 7.2 and shown Fig. 7.18. The tweeter is a SEAS type 27TFF (H0831) mounted in a 16 cm diameter sphere.