Errata corrige

▷ Equation number (4.54)

$$x_{an}(t) = 2\mathbf{F}^{-1}\left[X(f)u(f)\right]$$

▷ Equation number (5.7)

$$Y(f) = H(f)X(f)$$

▷ Equation number (5.18)

$$Y(f) = \frac{H(f)}{2}\left(\delta(f-f_0)+\delta(f+f_0)\right) = \frac{H(f_0)}{2}\delta(f-f_0) + \frac{H(-f_0)}{2}\delta(f+f_0) =$$

$$= \frac{M(f_0)}{2}e^{j\phi(f_0)}\delta(f-f_0) + \frac{M(-f_0)}{2}e^{j\phi(-f_0)}\delta(f+f_0)$$

▷ Substitute Figure 5.2 with Figure 0.1 here shown.

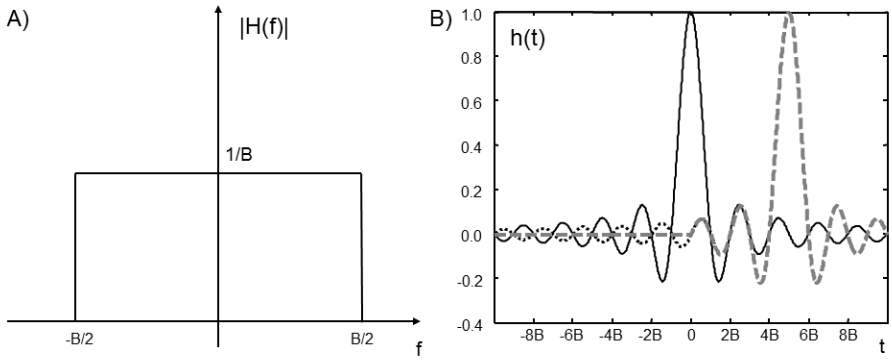

Figure 0.1 A) Transfer function of the ideal low pass filter. B) Impulse response of the ideal filter (solid line) and of a filter with delayed impulse response (dotted line). The ideal filter is not causal, but introducing a delay and neglecting the queue (dashed line), a causal filter is obtained which approximates the ideal filter.

▷ Equation number (6.23)

$$\varphi_y(\tau) = \lim_{T\to\infty}\frac{1}{T}\int_{-T/2}^{T/2} y(\phi+\tau)y^*(\phi)d\phi = \lim_{T\to\infty}\frac{1}{T}\int_{-\infty}^{+\infty} y(\phi+\tau)y^*(\phi)p_T(\phi)\,d\phi =$$

$$= \lim_{T\to\infty}\frac{1}{T}y(\tau)*y^*(-\tau)p_T(-\tau) = \lim_{T\to\infty}\frac{1}{T}h(\tau)*x(\tau)*h^*(-\tau)*x^*(-\tau)p_T(\tau) =$$

$$= h(\tau)*h^*(-\tau)*\lim_{T\to\infty}\frac{1}{T}x(\tau)*x^*(-\tau)p_T(\tau) = h(\tau)*h^*(-\tau)*\varphi_x(\tau)$$

▷ Equation number (7.17)

$$G_y(f) = \sum_{n=-\infty}^{+\infty} \left|H\left(\frac{n}{T}\right)\right|^2 |\mu_n|^2 \delta\left(f - \frac{n}{T}\right) = |H(f)|^2 G_x(f)$$

▷ Sentence after equation number (9.36)
...which takes all the values of the imaginary axis of the s plane (Laplace domain, $s = \sigma + j\omega_a$) as the numerical frequency varies in $\left[-\frac{1}{T_c}, \frac{1}{T_c}\right]$, so that we can write...

▷ Equation number (9.44)

$$BIBO \Leftrightarrow \sum_{n=-\infty}^{+\infty} |h\,[n]| < \infty$$

▷ Equation number (11.15)

$$\sigma_{\xi\eta} = E\left[(\xi - \mu_\xi)(\eta - \mu_\eta)\right]$$

▷ Equation (11.25)

$$\sigma^2 = \int (x-\mu)^2 f_X(x)dx = \int_{-\infty}^{\mu-\sqrt{K}} (x-\mu)^2 f_X(x)dx +$$
$$+ \int_{\mu-\sqrt{K}}^{\mu+\sqrt{K}} (x-\mu)^2 f_X(x)dx +$$
$$+ \int_{\mu+\sqrt{K}}^{+\infty} (x-\mu)^2 f_X(x)dx \geq$$
$$\geq \int_{-\infty}^{\mu-\sqrt{K}} + \int_{\mu+\sqrt{K}}^{+\infty} K f_X(x)dx = KP(|X-\mu| \geq \sqrt{K})$$

▷ Equation (11.29)

$$E[\hat{p}] = \frac{1}{N}E[Y] = p\,, \quad Var[\hat{p}] = \frac{1}{N^2}Var[Y] = \frac{p(1-p)}{N}$$

▷ Equation (11.46)

$$E\left[x\,(t)\,x\,(t+\tau)\right] = R_x\,(t, t+\tau) = \int x_1 x_2 f_{\zeta_1\zeta_2}\,(x_1, x_2; t, t+\tau)\,dx_1 dx_2$$

▷ Paragraph describing equations (11.89) and (11.90) The PSD at the output of an LTI system with impulse response $h(t)$

$$y\,(t) = h\,(t) * x\,(t)$$

is obtained by transforming the equation (11.87)

$$G_y(f) = |H(f)|^2 G_x(f)$$

where $H(f)$ is the transfer function of the system

- ▷ Page 75: discussion of the probability density of $\eta = H(\xi)$
  Given the probability density function of a random variable ξ, the probability density of a monotonic and invertible function of such a variable $\eta = H(\xi)$ can be obtained investigating the cumulative function of the variable η

$$F_\eta(y) = \int_{-\infty}^{y} f_\eta(y)dy = \int_{-\infty}^{H^{-1}(y)} f_\xi(x)dx = \int_{-\infty}^{y} f_\xi\left(H^{-1}(y)\right)\left|\frac{dH^{-1}(y)}{dy}\right| dy$$

where we considered that $P\left[\eta < y\right] = P\left[H(\xi) < y\right] = P\left[\xi < H^{-1}(y)\right]$. Thus we obtain the following expression for the probability density function of η

$$f_\eta(y) = f_\xi(H^{-1}(y))\left|\frac{dH^{-1}(y)}{dy}\right|$$

where the absolute value assures that the probability density is non negative.

- ▷ Page 86
  Change '... a voltage which increases with temperature' with '... a voltage with energy which increases with temperature'.
- ▷ Equation (12.9)

$$H = \frac{1}{-m}\frac{1}{(w - j\alpha_1)(w - j\alpha_2)} = \frac{1}{m}\frac{1}{(jw + \alpha_1)(jw + \alpha_2)}$$

- ▷ Equations (13.14) and (13.15)

$$\rho u_{tt} dxdy = \left(\mathbf{T}(x + dx, y) - \mathbf{T}(x, y)\right) \cdot \vec{i}dy + \left(\mathbf{T}(x, y + dy) - \mathbf{T}(x, y)\right) \cdot \vec{j}dx + Fdxdy$$

$$\rho\frac{\partial^2 u}{\partial t^2}dxdy = \frac{\partial \mathbf{T}}{\partial x} \cdot \vec{i}dxdy + \frac{\partial \mathbf{T}}{\partial y} \cdot \vec{j}dxdy + Fdxdy = \nabla \cdot \mathbf{T}dxdy + Fdxdy$$

- ▷ Figure 13.3: substitute with Figure 0.2 here shown.
- ▷ Equation number (14.8)

$$\tilde{W}_2 = X_2 - \frac{X_1}{3}$$

- ▷ Equation number (14.9)

$$\left\|\tilde{W}_2\right\| = \sqrt{\int_0^3 \tilde{W}_2^2 dt} = \sqrt{2\left(1 - \frac{1}{3}\right)^2 + \left(-1 - \frac{1}{3}\right)^2}$$

- ▷ Equation number (14.13)

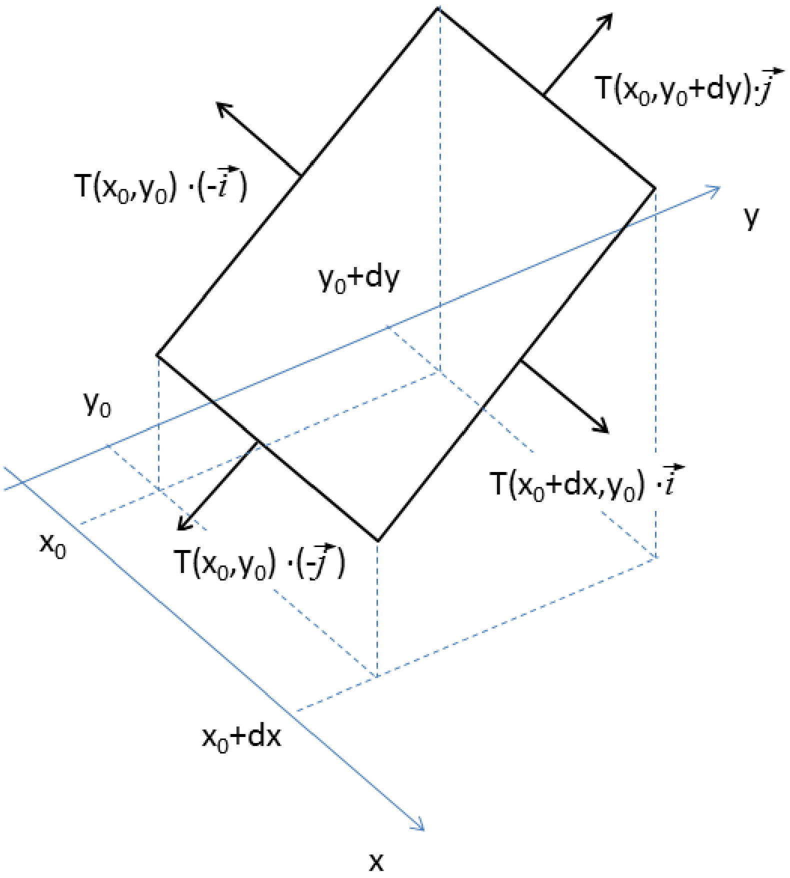

Figure 0.2 Stress acting on an infinitesimal membrane element.

$$W_4 = \frac{X_4}{\|X_4\|} = \frac{X_4}{\sqrt{2}}$$

- ▷ Solution of the additional exercise (1) of chapter 16.
  Input: $\sin(10\pi t) + \cos(20\pi t)$.
  Output: $\frac{1}{\sqrt{2^2+15^2}} \sin(10\pi t + \theta_1) + \frac{1}{\sqrt{2^2+30^2}} \cos(20\pi t + \theta_2)$, where $\theta_1 = -\arctan \frac{15}{2}$ and $\theta_2 = -\arctan 15$.
- ▷ Solution of the additional exercise (2) of chapter 16.
  Input: $\sin(2\pi f_0 t) + \cos(4\pi f_0 t)$.
  Output: if $f_0 > B$ the output is 0; if $B/2 < f_0 < B$ the output is $\sin(2\pi f_0 t)$; if $2f_0 < B$, the output is the same as the input.

▷ Substitute Figure 11.5 with Figure 0.3 here shown.

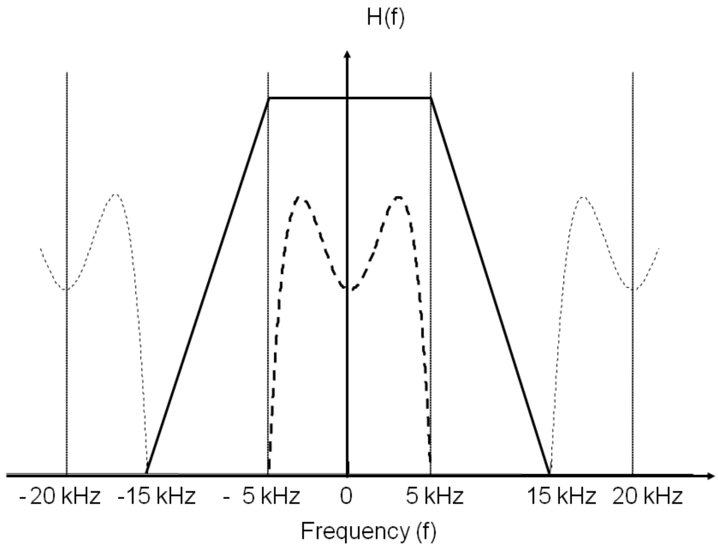

Figure 0.3 Plot of the low pass filter superimposed to the sampled signal of Exercise 17.3 showing the values for which the conditions necessary to recover the signal are satisfied.

▷ Page 154.
Change 'Then, since $\sum E[v(nT)] = m_v$ and $\sum h(t - nT) = 1$, we get...' into 'Then, since $E[v(nT)] = m_v$ and $\sum h(t - nT) = 1$, we get...'

▷ Equation number (18.16)

$$E[y(t)] = E[x(t - \theta)] = E_\theta[E_x[x(t - \theta)|\theta]]$$

▷ Equation (18.21), last part

$$= \frac{1}{T} \int_{t_1 - \frac{T}{2}}^{t_1 + \frac{T}{2}} R_x(\alpha, t_2 - t_1 + \alpha) d\alpha = R_y(t_2 - t_1)$$