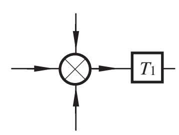
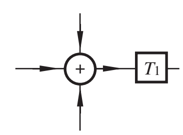
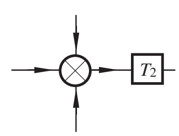
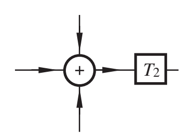
Errata in first printing of "*Two-Dimensional Digital Filters*"

by Wu-Sheng Lu and A. Antoniou, Marcel Dekker, 1992.

Page No.	Line No.	As printed	Correct version
14	4	$\sum_{i=1}^{N_1} b_{i0} x(n_1 - i, n_2)$	$\sum_{i=1}^{N_1} b_{i0} y(n_1 - i, n_2)$
29	2	$\leq \infty$	$< \infty$
32	13	$h_2(i)$	$h_2(j)$
35	16	$[1\ n_2^{-1}\ n_2^{-2}\ \cdots\ n_2^{-N_1}]^T$	$[1\ n_2^{-1}\ n_2^{-2}\ \cdots\ n_2^{-N_2}]^T$
35	$-15^{\dagger}$	$N_1 \times N_2$	$(N_1 + 1) \times (N_2 + 1)$
45	-4	$\mathbf{c}_1 = [\tilde{c}_{10} \ldots \tilde{a}_{N_{10}}]$	$\mathbf{c}_1 = [\tilde{a}_{10} \ldots \tilde{a}_{N_{10}}]$
48	-13	$\times q(i-1,\, j-1)]$	$\times q(i-1,\, j-1)$
51	Eq. (2.18)	$\mathbf{p}(N,\, M-1)$	$\mathbf{p}(N,\, M)$
52	Figure 2.5		
52	Figure 2.5		
53	-9	$\mathbf{A}_1 =$	$\mathbf{A}_4 =$
65	-8	$\dfrac{1}{1.25 - \cos\omega}$	$\dfrac{1}{1.25 - \cos\ \omega}$
67	-4	$\leftrightarrow$	$=$
74	17 and 18	A. Antoniou, *Digital Filters: Analysis and Design*, New York: McGraw-Hill, 1979 (2nd ed. in press).	A. Antoniou, *Digital Filters: Analysis, Design, and Applications*, 2nd ed., New York: McGraw-Hill, 1993.
84	14	$2 - z_1^{-1} z_2^{-1}$	$2 - z_1^{-1} - z_2^{-1}$
87	5	$-e^{-j[(n_1-k_1)\omega_1 T_1 + (n_2+k_2)\omega_2 T_2]}$	$-e^{-j[(n_1-k_1)\omega_1 T_1 + (n_2-k_2)\omega_2 T_2]}$

[†] Count from the bottom of the page for negative numbers.

Page No.	**Line No.**	**As printed**	**Correct version**
87	-9	$e^{j(n_1\omega_1 T_1+n_2\omega_2 T_1)}$	$e^{j(n_1\omega_1 T_1+n_2\omega_2 T_2)}$
100	9	$M_1(\omega_1, \omega_2)$	$M_1(\omega_1)$
100	11	$M_2(\omega_1, \omega_2)$	$M_2(\omega_2)$
107	-9	zero coprime without being factor coprime	factor coprime without being zero coprime
113	14	$z_i^{N_1}\bar{D}(z_1^{-1}, 1)$	$z_1^{N_1}\bar{D}(z_1^{-1}, 1)$
114	Eq. (5.17)	$z_1^k f(z_1^{-1})$	$z_1^K f(z_1^{-1})$
115	-1	0.0254	0.0264
118	15	$1-1.7z+0.92z^{-2}-0.16z^{-3}$	$1-1.7z^{-1}+0.92z^{-2}-0.16z^{-3}$
121	4	condition 2(ii)	condition 1(ii)
122	Eq. (5.25)	$\sum_{k=o}^{\infty}$	$\sum_{k=0}^{\infty}$
122	13	$\sum_{k=1}^{\infty}(\mathbf{A}^T)^k\mathbf{Q}\mathbf{A}^k$	$\sum_{k=0}^{\infty}(\mathbf{A}^T)^k\mathbf{Q}\mathbf{A}^k$
122	-5	$\mathbf{P}^*(z)\mathbf{G}(z)\mathbf{P}(z)-\mathbf{G}(z)$	$\mathbf{G}^*(z)\mathbf{P}(z)\mathbf{G}(z)-\mathbf{P}(z)$
129	9	$-0.72z_2^{-1}z_2^{-2}$	$-0.72z_1^{-1}z_2^{-2}$
129	-4	$\mathbf{A}_3=[-9.952]$	$\mathbf{A}_3=[-9.95\quad 2]$
130	-6	$\lvert z_1^{-1}\leq 1$	$\lvert z_1^{-1}\rvert\leq 1$
134	Eq. (6.2)	$e^{j(\omega_1 n_1 T_1+\omega_2 n_2 T_2)}$	$e^{-j(\omega_1 n_1 T_1+\omega_2 n_2 T_2)}$
137	Eq. (6.11)	$\times\sin\left[\left(\frac{N_2-1}{2}-n_2\right)T_2\omega_2\right]$	$\times\sin\left[\left(\frac{N_2-1}{2}-n_2\right)T_2\omega_2\right]\}$
148	3	$h_I(n_1T_1,\, n_2T)$	$h_I(n_1T,\, n_2T)$
148	5	T_2	T^2
152	10	$\sqrt{\delta_p\delta_a}$	$\sqrt{\delta_{pl}\delta_{al}}$
152	-11	Eq. (26)	Eq. (6.26)
162	12	$d\nu_2))d\nu_1$	$d\nu_2)d\nu_1$

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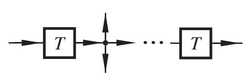
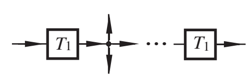
164	1	(a) 3-D pilot	(a) 3-D plot
165	−1	$a_2(nT)$	$a_2(n_1T_1,\, n_2T_2)$
166	1	$(\cos\ \omega_i T^{\mathrm{i}})^{n_i}$	$(\cos\ \omega_i T_i)^{n_i}$
166	3	$a_3(nT)$	$a_3(n_1T_1,\, n_2T_2)$
168	Eq. (6.59)	$+(1-A-B-D)$	$-(1-A-B-D)$
168	−1	$\alpha^2-\alpha\delta+\delta^2$	$\alpha^2-2\alpha\delta+\delta^2$
169	5	$\alpha^2-\alpha\delta+\delta^2$	$\alpha^2-2\alpha\delta+\delta^2$
171	15	$a_2(nT)$	$a_2(n_1T_1,\, n_2T_2)$
171	16	$a_3(nT)$	$a_3(n_1T_1,\, n_2T_2)$
171	−4	$\mathbf{b}=\begin{bmatrix}0.5514\\0.2525\\0.9135\end{bmatrix}$	$\mathbf{b}=-\begin{bmatrix}0.5514\\0.2525\\0.9135\end{bmatrix}$
173	25 and 26		see correction for p. 74, lines 17–18
205	−7	$(\frac{T}{2})^{N-M}$	$\left[\frac{T}{2}(z_1+1)(z_2+1)\right]^{N-M}$
227	19 and 20		see correction for p. 74, lines 17–18
228	−12	$\dfrac{0.2457}{\prod_{i=1}^{2}(s-p_i)(s-p_i^*)}$	$\dfrac{0.2557}{\prod_{i=1}^{2}(s-p_i)(s-p_i^*)}$
229	2	$\delta_{p1}=\delta_{p2}=0.03$	$\Delta_p=0.03$
229	3	$\delta_{a_1}=\delta_{a_2}=0.05$	$\Delta_a=0.05$
229	8	$\delta_p=\delta_a=0.08$	$\Delta_p=\Delta_a=0.08$
231	−3	$\omega_{1n_1}=\omega_{s_1}(n_1-1)/2(N_1-1)$	$\omega_{1n_1}=\omega_{s_1}(n_1-1)/[2(N_1-1)]$
231	−3	$\omega_{1n_2}=\omega_{s_2}(n_2-1)/2(N_2-1)$	$\omega_{2n_2}=\omega_{s_2}(n_2-1)/[2(N_2-1)]$
233	11	$H(e^{-j\omega_1n_1T_1},\, e^{-j\omega_2n_2T_2})$	$\bar{H}(e^{-j\omega_1n_1T_1},\, e^{-j\omega_2n_2T_2})$
235	−3	formulas	Eq. (8.4) with
235	−2	$\dfrac{\partial J}{\partial a_{ij}}$	$\dfrac{\partial H}{\partial a_{ij}}$

Page No.	Line No.	As printed	Correct version
235	-1	$\dfrac{\partial J}{\partial b_{ij}}$	$\dfrac{\partial H}{\partial b_{ij}}$
236	-3	$(z_1,\, z_2)^{-1}$	$(z_1 z_2)^{-K}$
237	-7	$\prod_{k=1}^{K} \dfrac{N_k}{D_k}$	$\lvert H_0\rvert \prod_{k=1}^{K} \dfrac{N_k}{D_k}$
238	-9	H_0	$\lvert H_0 \rvert$
241	2	$\phi_i(\tilde{\mathbf{x}},\, \xi) \geq 0$	$\phi_i(\tilde{\mathbf{x}},\, \xi) > 0$
241	4	STEP 8	STEP 4
241	-12	$\sum_{i\in I_2} \lambda_i \phi_i(\mathbf{x},\, \xi) \nabla \phi_i(\mathbf{x},\, \xi)$	$\sum_{i\in I_2} \phi_i(\mathbf{x},\, \xi) \nabla \phi_i(\mathbf{x},\, \xi)$
242	2	$(\cos\omega_{1i}T_1 + \cos\omega_{2i}T_2)$	$2(\cos\omega_{1i}T_1 + \cos\omega_{2i}T_2)$
249	Eq. (8.22)	$z_1^{-n_1} z_2^{-n_2}$	$a_{n_1 n_2} z_1^{-n_1} z_2^{-n_2}$
263	-20	analog	analogue
263	-5	Mita	Mitra
263	7 and 8		see correction for p. 74, lines 17–18
264	17	$\omega_{p_1} = \omega_{p_2} = 0.12$	$\omega_{p_1} = \omega_{p_2} = 0.12\pi$
267	12	(6.9)	(6.6)
269	-7	$(1 - \omega_a)$	$(\pi - \omega_a)$
269	-4	$= 1$	$= \pi$
269	-3	$n_a = 9$	$n_c = 9$
270	-1	$\mathbf{x} = \begin{bmatrix} a(0,\,0) \\ a(0,\,1) \\ \vdots \\ a(0,\, \frac{N-1}{2}) \\ \vdots \\ a(i,\, i) \\ \vdots \\ a(i,\, \frac{N-1}{2}) \\ \vdots \\ a(\frac{N-1}{2},\, \frac{N-1}{2}) \end{bmatrix}$	$\mathbf{x} = \begin{bmatrix} a(0,\,0) \\ a(1,\,0) \\ \vdots \\ a(\frac{N-1}{2},\, 0) \\ \vdots \\ a(i,\, i) \\ \vdots \\ a(\frac{N-1}{2},\, i) \\ \vdots \\ a(\frac{N-1}{2},\, \frac{N-1}{2}) \end{bmatrix}$

Page No.	Line No.	As printed	Correct version
271	3	$\cos i\omega_1 \cos[(N-1)\omega_1/2]$ $+\cos[(N-1)\omega_2/2]\cos i\omega_2$	$\cos i\omega_1 \cos[(N-1)\omega_2/2]$ $+\cos[(N-1)\omega_1/2]\cos i\omega_2$
282	−10	*Processing*	*Process.*
282	−5 and −4		see correction for p. 74, lines 17–18
289	−3	$\mathbf{U} \in R^{r_c \times N_1}$	$\mathbf{U} \in R^{r_c \times N_2}$
290	11	$r_c(N_1 + N_2 - r_c) - 1$ and	$r_c(N_1 + N_2 - r_c) - r_c$ and
290	13	filter is linear,	filter is linear and quadrantally symmetric,
290	16	$\tilde{\mathbf{C}} \in R^{(N_1-1)/2 \times (N_2+1)/2}$	$\tilde{\mathbf{C}} \in R^{(N_1+1)/2 \times (N_2+1)/2}$
292	−1	$e_2 = \left[\oint_{\|z_2\|=1}\right.$	$e_2 = \left[\frac{1}{(2\pi j)^2} \oint_{\|z_2\|=1}\right.$
293	1	Eqs. (10.8) and (10.16)	Eqs. (10.8) and (10.17)
293	6	$\bar{\mathbf{z}}_1 \mathbf{z}_1^T$	$\frac{\bar{\mathbf{z}}_1 \mathbf{z}_1^T}{2\pi j}$
293	6	$\mathbf{z}_2 \bar{\mathbf{z}}_2^T$	$\frac{\mathbf{z}_2 \bar{\mathbf{z}}_2^T}{2\pi j}$
295	Figure 10.5		
298	Figure 10.8	b_{00}^{-1}	$-b_{00}^{-1}$
298	Figure 10.8	α_0	$-\alpha_0$
314	7 and 8		see correction for p. 74, lines 17–18
321	10	$[b_{ij} y(n_1 - i,\, n_2 - j)]_q$	$[b_{ij} \bar{y}(n_1 - i,\, n_2 - j)]_q$
321	−9	$-[b_{ij} y(n_1 - i,\, n_2 - j)]_q\} + y(n_1,\, n_2)$	$-[b_{ij} y(n_1 - i, n_2 - j)]_q\}$
322	Table 11.3	$\frac{E_0^2}{12(k+l)}$	$\frac{E_0^2(k+l)}{12}$
322	Table 11.3	$\frac{E_0^2}{3(k+l)}$	$\frac{E_0^2(k+l)}{3}$
322	Table 11.3	$\frac{E_0^2}{2(k+l)}$	$\frac{E_0^2(k+l)}{2}$

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323	Eq. (11.9)	$\lvert z_1\rvert \le 1,\ \lvert z_2\rvert \le 1$	$\lvert z_1^{-1}\rvert \le 1,\ \lvert z_2^{-1}\rvert \le 1$
325	11	$\frac{3(z_1-1)^2}{2(z_1-1)}$	$\frac{3(z_1-1)^2}{2(z_1-2)}$
327	−10	$\begin{bmatrix}\Delta\bar{q}^H(i,\,j)\\ \Delta\bar{q}^V(i,\,j)\end{bmatrix} = \begin{bmatrix}\bar{q}^H(i,\,j)\\ \bar{q}^V(i,\,j)\end{bmatrix} - \begin{bmatrix}q^H(i,\,j)\\ q^V(i,\,j)\end{bmatrix}$	$\begin{bmatrix}\Delta q^H(i,\,j)\\ \Delta q^V(i,\,j)\end{bmatrix} = \begin{bmatrix}\bar{q}^H(i,\,j)\\ \bar{q}^V(i,\,j)\end{bmatrix} - \begin{bmatrix}q^H(i,\,j)\\ q^V(i,\,j)\end{bmatrix}$
328	Eq. (11.18)	$\mathbf{c}\sum_{(0,0)<(l,k)}\sum_{\le(i,j)} \left(\mathbf{A}_{l-1,\,k}\begin{bmatrix}\boldsymbol{\tau}_1(i-l,\,j-k)\\ \mathbf{0}\end{bmatrix} + \mathbf{A}_{l,k-1}\begin{bmatrix}\mathbf{0}\\ \boldsymbol{\tau}_2(i-l,\,j-k)\end{bmatrix}\right) + \gamma(i,\,j)$	$\mathbf{c}\sum_{(0,0)\le(l,k)}\sum_{\le(i,j)} \left(\mathbf{A}_{l,k}\begin{bmatrix}\boldsymbol{\tau}_1(i-l,\,j-k)\\ \boldsymbol{\tau}_2(i-l,\,k-j)\end{bmatrix}\right) +\gamma(i,\,j)$
329	Eq. (11.24)	$\mathbf{e}_p^T\left(\sum_{l=0}^{i}\sum_{k=0}^{j}\mathbf{f}(l,\,k)\mathbf{f}^T(l,\,k)\right)\mathbf{e}_p^T$	$\mathbf{e}_p^T\left(\sum_{l=0}^{i}\sum_{k=0}^{j}\mathbf{f}(l,\,k)\mathbf{f}^T(l,\,k)\right)\mathbf{e}_p$
335	Eq. (11.33)	$\mathbf{H}^H(e^{j2\pi k_1/M_1},\, e^{j2\pi k_2/m_2})$	$\mathbf{H}^H(e^{j2\pi k_1/M_1},\, e^{j2\pi k_2/M_2})$
339	−2 and −1		see correction for p. 74, lines 17–18
340	Prob. 11.4(a)	$2 - z_1 - z_2$	$3 - z_1 - z_2$
340	Prob. 11.4(b)	$2 - z_1 z_2 - z_1 - z_2$	$4 - z_1 z_2 - z_1 - z_2$
346	13 and 14	$R_y = \{0 \le n_1 \le N_1 + M_1 - 1,$ $0 \le n_2 \le N_2 + M_2 - 1\}$	$R_y = \{0 \le n_1 \le N_1 + M_1 - 2,$ $0 \le n_2 \le N_2 + M_2 - 2\}$
346	19	$P_1 \ge N_1 + M_1 - 1$ and $P_2 \ge N_2 + M_2 - 1$	$P_1 \ge N_1 + M_1 - 2$ and $P_2 \ge N_2 + M_2 - 2$
349	Eq. (12.17)	$-W_N^{k_1+k_2}F_{oo}(k_1,\,k_2)$	$+W_N^{k_1+k_2}F_{oo}(k_1,\,k_2)$
350	Figure 12.1	F_{oo}	F_{ee}
350	Figure 12.1	F_{ee}	F_{oo}
357	−11 and −10		see correction for p. 74, lines 17–18
375	3	or $0 \le n_2 \le P_2 - 1$	or $3 \le n_2 \le P_2 - 1$
387	4 and 5		see correction for p. 74, lines 17–18