All Corrections over First Impression, 2006

page	location	text appearing	correction
12	line 26	$(-1)^{i+j}\sum_j a_{ij}M_{ij}$	$\sum_j(-1)^{i+j}a_{ij}M_{ij}$
	line 28	$(-1)^{i+j}\sum_i a_{ij}M_{ij}$	$\sum_i(-1)^{i+j}a_{ij}M_{ij}$
19	line 25-26	$\mathbf{v}_1$, $\mathbf{v}_2$, $\cdots$, $\mathbf{v}_m$ when the corresponding m vectors	$\mathbf{v}_1$, $\mathbf{v}_2$, $\cdots$, $\mathbf{v}_l$, $l \le m$, when the given m vectors
33	line 9	Crout's algorithm	Doolittle's algorithm
	line 11	For $i = 1, 2, 3, \cdots, n$	For $j = 1, 2, 3, \cdots, n$
	line 5 from bottom	Doolittle's algorithm	Crout's algorithm
36	line 5 from bottom	positive semi-definite quadratic form	positive semi-definite
68	line 1	symmetric matrix matrices.	symmetric matrices.
78	line 4	(β_j, β_{j+1})	(β_{j+1}, β_j)
85	lines 21 and 22	$\mathcal{Q}_k^T\mathbf{A}_k\cdots$	$\mathcal{Q}_k^T\mathbf{A}\cdots$
86	line 4	$\mathcal{Q}_k^T\mathbf{A}_k\mathbf{q}_2$	$\mathcal{Q}_k^T\mathbf{A}\mathbf{q}_2$
92	line 3	Row $(i+1)$	Row $(r+1)$
	line 4	first r rows and first $r+1$ columns	first $r+1$ rows and first $r-1$ columns
	line 6	Column$(r+1)+\cdots$	Column $(r+1)+\cdots$
98	line 13	(positive)	(non-negative)
106	line 16	superposition	superimposition
107	line 10	consititute	constitute
113	line 6	$(\mathbf{a}, \mathbf{b})$	$\lvert(\mathbf{a}, \mathbf{b})\rvert$
122	line 8 from bottom	$\cdots + \frac{1}{2}f''(x)\delta x + \cdots$	$\cdots - \frac{1}{2}f''(x)\delta x - \cdots$
127	line 3 from bottom	superpose	superimpose
129	line 1 from bottom	$(\mathbf{q}\ \mathbf{r}\ \mathbf{s})\mathbf{p} - (\mathbf{p}\ \mathbf{r}\ \mathbf{s})\mathbf{q}$.	$(\mathbf{p}\ \mathbf{r}\ \mathbf{s})\mathbf{q} - (\mathbf{q}\ \mathbf{r}\ \mathbf{s})\mathbf{p}$.
131	line 5	$\int_a^b d\mathbf{r}$	$\int_a^b \lVert d\mathbf{r}\rVert$
	line 8	$s(t) = \int_a^t \sqrt{\mathbf{r}' \cdot \mathbf{r}'}\ d\tau$	$s(t) = \int_a^t \sqrt{\mathbf{r}'(\tau) \cdot \mathbf{r}'(\tau)}\ d\tau$
	line 11	the $t^*(t)$ is a monotonic function.	$t^*(t)$ is a strictly increasing function.
152	line 5 from bottom	complex roots	complex roots (with non-zero imaginary parts)
162	line 14-15	a finitely many	finitely many

163	line 11	x^* in interval J is a solution	x^* is the unique solution in interval J
	line 6 from bottom	larger than the validity	larger than what the validity
178	line 11	Superpose	Superimpose
190	line 17	$\mathbf{d}_i^T\mathbf{d}_j = 0$	$\mathbf{d}_i^T\mathbf{g}_j = 0$
198	line 14	outlined	outline
	line 2 from bottom	superposed	superimposed
217	lines 19-20	Maximize $\cdots$, subject to $\cdots$, $\boldsymbol{\mu} \geq \mathbf{0}$.	Maximize $\cdots$, $\boldsymbol{\mu} \geq \mathbf{0}$; with $\mathbf{x}$ satisfying $\cdots$.
	line 24	$\frac{1}{2}\mathbf{c}^T\mathbf{c}$	$\frac{1}{2}\mathbf{c}^T\mathbf{Q}^{-1}\mathbf{c}$
230	lines 9 and 12	$\int_{x_{i-1}}^{x_i} f(x)dx \approx \cdots$	$\int_{x_{i-1}}^{x_i} f(x)dx = \cdots$
232	line 21	$J = \cdots - \frac{h^5}{90} f^{iv}(x_i)$.	$J = \cdots - \frac{h^5}{90} f^{iv}(x_i) + \cdots$.
237	line 16	Equate $\cdots$ to determine	Equate $\cdots$ to zero to determine
247	line 18 (Eqn. 29.5)	$y_{n+1} = \cdots$	$y(x_{n+1}) = \cdots$
255	line 19	$\Delta_{n+1} = \left[1 + h\lambda + \frac{h^2\lambda^2}{2}\right]\Delta_n$.	$\Delta_{n+1} \approx \left[1 + h\lambda + \frac{h^2\lambda^2}{2}\right]\Delta_n$.
261	line 13	gradient $\frac{\partial \mathbf{E}}{\partial \mathbf{p}}$	Jacobian $\frac{\partial \mathbf{E}}{\partial \mathbf{p}}$
267	line 8 from bottom	$\lvert(y_1)_0 - (y_2)_0\rvert < \epsilon$	$\lvert(y_1)_0 - (y_2)_0\rvert = \epsilon$
268	line 7	$\frac{\partial f}{\partial y}(\xi)$	$\frac{\partial f}{\partial y}(x, \xi)$
269	line 11	$z_{n-1} = z_n$	$z'_{n-1} = z_n$
	line 16	is guaranteed	are guaranteed
274	line 16	$u + x\frac{du}{dx}$	$\frac{1}{b_2}\left[\frac{du}{dx} - a_2\right]$
280	line 4 from bottom	toward	towards
290	line 3	one solution	one non-trivial solution
	line 10	superposition	superimposition
300	line 13	second case	third case
302	line 6 from bottom	page 299	page 298
303	line 6 from bottom	$D_t \equiv \left(\frac{d}{dt} - 1\right)$	$D_t \equiv \frac{d}{dt}$
304	line 16	given equation.	given equations.
321	Fig. 38.1: axes	x_1, x_2	y_1, y_2

326	lines 24-25	having continuous first order partial derivatives ($\frac{\partial V}{\partial y_i}$) and vanishing at the origin	vanishing at the origin
	line 31	consider a function $V(\mathbf{y})$	consider a function $V(\mathbf{y})$, having continuous first order partial derivatives ($\frac{\partial V}{\partial y_i}$),
335	Table 39.1	$y'' + xy = 0$ $(1-x^2)y'' - xy + k^2y = 0$	$y'' \pm k^2xy = 0$ $(1-x^2)y'' - xy' + k^2y = 0$
338	line 2	a_m	a_{2m}
	Fig. 39.2	Annotations $J_0(x)$ and $J_1(x)$	[to be interchanged]
339	line 6 from bottom	$(1-x^2)y'' - xy + k^2y = 0$	$(1-x^2)y'' - xy' + k^2y = 0$
340	line 6 from bottom	the ODE	the ODE as well as the BC's
341	lines 7-8	a non-trivial solution, and what is the corresponding solution (eigenfunction), up to an arbitrary scalar multiple?	non-trivial solutions, and what are the corresponding solutions (eigenfunctions), up to arbitrary scalar multiples?
349	line 5 from bottom	Superpose	Superimpose
	line 1 from bottom	$\phi_k,\ k = 1, 2, \cdots$	$\phi_n,\ n = 1, 2, \cdots$
357	line 4	$\int_0^\infty A(p)\cos px\,dx$	$\int_0^\infty A(p)\cos px\,dp$
	line 6	$\int_0^\infty B(p)\sin px\,dx$	$\int_0^\infty B(p)\sin px\,dp$
359	line 4 from bottom	that practice	the other practice
360	line 12	$K(s,x) = e^{-st}$	$K(s,t) = e^{-st}$
365	line 7 from bottom	superpose	superimpose
370	line 23	$f(x)$,	$f(x)$ over $[a,b]$,
	lines 33, 38	-1, m, n	a, m, n
	lines 34, 39	l, 1	l, b
376	line 9 from bottom	spring	string
386	line 18	$T'' + \lambda^2 T = 0$	$T'' + c^2\lambda^2 T = 0$
	lines 19 and 22	$A_{mn}\cos\lambda_{mn}t + B_{mn}\sin\lambda_{mn}t$	$A_{mn}\cos c\lambda_{mn}t + B_{mn}\sin c\lambda_{mn}t$
	line 25	$B_{mn}\lambda_{mn}$	$c\lambda_{mn}B_{mn}$
391	line 2 from bottom	at	with
392	line 1	at	with
410	line 14	$\frac{(m+n)!}{(n+1)!}\sum_{n=-1}^\infty a_n(z-z_0)^{n+1}$	$\sum_{n=-1}^\infty \frac{(m+n)!}{(n+1)!} a_n(z-z_0)^{n+1}$

415	line 21	$\sqrt{\frac{1+y'2}{2gy}}$	$\sqrt{\frac{1+y'^2}{2gy}}$
417	line 22	presecribed	prescribed
427	line 18	$\lambda_1 = \min \int_a^b [r(x)y_1'^2 - q(x)y_1^2]dx$	$\lambda_1 = \int_a^b [r(x)y_1'^2 - q(x)y_1^2]dx$
432	line 15	and Applications	with Applications
437	line 13 line 16	$\frac{1-(-1)^n}{2}$ $\mathbf{P}\bar{\mathbf{P}} = \mathbf{I}_{m+1}$	$\frac{1-(-1)^n}{2^n}$ $(\bar{\mathbf{A}}\bar{\mathbf{A}}^T)\bar{\mathbf{P}} = \mathbf{I}_{m+1}$
438	line 7	$\begin{bmatrix} 1/a & 0 & 0 \\ -ba'/d & 1/d & 0 \\ -(ca'+eb')/f & -ed'/f & 1/f \end{bmatrix}$	$\begin{bmatrix} \frac{1}{a} & 0 & 0 \\ -\frac{b}{ad} & \frac{1}{d} & 0 \\ \frac{be-cd}{adf} & -\frac{e}{df} & \frac{1}{f} \end{bmatrix}$
440	line 19	$\begin{bmatrix} \lambda_1 & \mathbf{b}_1^T \\ \mathbf{0} & \mathbf{A}_1 \end{bmatrix}$	$\begin{bmatrix} \lambda_1 & \mathbf{b}_1^T \\ \mathbf{0} & \mathbf{A}_1 \end{bmatrix}$, $\mathbf{b}_1^T = \mathbf{q}_1^T\mathbf{A}\overline{\mathbf{Q}}_1$, $\mathbf{A}_1 = \overline{\mathbf{Q}}_1^T\mathbf{A}\overline{\mathbf{Q}}_1$
443	line 1 from bottom	but from symmetry, $\mathbf{A}^T\mathbf{A} = \mathbf{A}^2 = \mathbf{V}\Lambda^2\mathbf{V}$	while from symmetry, $\mathbf{A} = \mathbf{V}\Lambda\mathbf{V}^T$ and $\mathbf{A}^T\mathbf{A} = \mathbf{A}^2 = \mathbf{V}\Lambda^2\mathbf{V}^T$
448	line 8	$\int \mathbf{g} \cdot d\mathbf{r}$	$\mathbf{g} \cdot d\mathbf{r}$
450	line 6	periodic oscillations	almost periodic oscillations
451	line 12	$x^* = 2.5.$	$x^* = 2.5,\ p(x^*) = -78.125.$
452	line 5 line 15 line 16	$x_1^2 + 1 \geq 18x_2.$ $(0, -1, -0.833)$ 0.834	$18x_1^2 + 1 \geq 18x_2.$ $(0, -1, -0.667)$ 0.083
459	line 3 from bottom	$q_1'(0) = 0$	$q_1'(3) = 0$
462	lines 8-9 line 9	$[w_0 - w_2]f'''(x_1)h^4$ $f^{iv}(x)$	$\frac{1}{6}[w_0 - w_2]f'''(x_1)h^4$ $f^{iv}(x_1)$
466	line 18	As cosequences,	As a consequence,
469	line 5	Valid only for $\cdots$.	[Guaranteed to be valid for $\cdots$.]
474	Fig. A.38 line 1 lines 4 and 9	ordinate values 1 and -1 $\begin{bmatrix} 3e^t + 6e^{-t} - \sin t - 2 \\ 9e^t + 6e^{-t} - 2\sin t - \cos t - 3 \end{bmatrix}$ $\begin{bmatrix} \sqrt{\gamma(\beta-1)} \\ \sqrt{\gamma(\beta-1)} \\ \beta - 1 \end{bmatrix}$	ordinate values kc and $-kc$ $\begin{bmatrix} 2e^t + 3e^{-t} - \sin t + 2 \\ 6e^t + 3e^{-t} - \cos t - 2\sin t + 3 \end{bmatrix}$ $\begin{bmatrix} \pm\sqrt{\gamma(\beta-1)} \\ \pm\sqrt{\gamma(\beta-1)} \\ \beta - 1 \end{bmatrix}$

	line 9	$\begin{bmatrix} \alpha(z_2 - z_1) \\ z_1 - z_2 - \sqrt{\gamma(\beta-1)}z_3 \\ \sqrt{\gamma(\beta-1)}(z_1+z_2) - \gamma z_3 \end{bmatrix}$	$\begin{bmatrix} \alpha(z_2 - z_1) \\ z_1 - z_2 - \mp\sqrt{\gamma(\beta-1)}z_3 \\ \pm\sqrt{\gamma(\beta-1)}(z_1+z_2) - \gamma z_3 \end{bmatrix}$
	line 2 from bottom	$\omega = \dot{\phi}$	$\omega = \phi'$
475	line 8	eigenvalues $-1, 2$	eigenvalues $-2, 1$
	line 5 from bottom	$\cdots + \frac{1}{2}x^3 \frac{1}{3}x^4 + \cdots$	$\cdots + \frac{1}{2}x^3 + \frac{1}{3}x^4 + \cdots$
476	line 4	a polynomial	a polynomial in the form $a_k \left[x^k - \frac{k}{1!2^2}x^{k-2} + \frac{k(k-3)}{2!2^4}x^{k-4} - \frac{k(k-4)(k-5)}{3!2^6}x^{k-6} + \cdots\right]$
	line 4 from bottom	$x = cos\theta$	$x = \cos\theta$
	line 2 from bottom	extrema at ± 1	extrema of value ± 1
	line 1 from bottom	uniformly in θ	uniformly over θ
479	line 15	superposed	superimposed
	line 7 from bottom	$(t+1)\mathrm{Si}\frac{(t+1)\pi}{2} + (t+1)\mathrm{Si}\frac{(t+1)\pi}{2}$	$(t+1)\mathrm{Si}\frac{(t+1)\pi}{2} + (t-1)\mathrm{Si}\frac{(t-1)\pi}{2}$
482	line 11	$\frac{\cos px \cos pt}{1+p^2}$	$\frac{\cos px \cos cpt}{1+p^2}$
483	line 4	$32n$	$16n$
484	line 14	$u_r(r, 0) = g(r)$	$u_t(r, 0) = g(r)$
485	line 2	negative real axis (i.e. $\theta = \pm\pi$).	negative real axis (i.e. $\theta = \pm\pi$), including the origin ($r = 0$).
	line 3	$w(z) = ize^{-z} + c$.	$w(z) = i(ze^{-z} + c)$.
	line 1 from bottom	$\nabla^2\phi = 0$ and $\nabla^2\psi = 0$.	$\phi(x, y)$ and $\psi(x, y)$ are harmonic functions satisfying Cauchy-Riemann conditions in z-plane as well.
486	line 1	$\psi(x, y) + Uy(3x^2 - y^2)$	$\psi(x, y) = Uy(3x^2 - y^2)$
488	line 8	pont	point
	line 12	$f(z) = \frac{g(z)}{(z-z_0)^p}$, where $g(z)$ is	$f(z) = \frac{h(z)}{(z-z_0)^p}$, where $h(z)$ is
	line 1 from bottom	Boundary conditions $\delta x = \delta y = \delta\dot{x} = \delta\dot{y} = 0$ lead to	Use boundary conditions $\delta x = \delta y = 0$ to evaluate
489	line 4	$x = \frac{k}{2}(\theta - \sin\theta)$	$x = \frac{k}{2}(\theta - \sin\theta) + a$
495	line 3 from bottom	$\ln x$	$\ln \lvert x\rvert$
496	line 1	$\ln\sec x$	$\ln\lvert\sec x\rvert$
		$\ln\sin x$	$\ln\lvert\sin x\rvert$
	line 2	$\ln(\sec x + \tan x)$	$\ln\lvert\sec x + \tan x\rvert$
		$\ln(\csc x - \cot x)$	$\ln\lvert\csc x - \cot x\rvert$

Corrigendum (as appeared in first impression, 2006)

page	location	text appearing	correction
33	line 13	$\frac{1}{u_{ij}}$	$\frac{1}{u_{jj}}$
36	line 1	descrbied	described
41	line 18	full-rank	invertible
181	Fig. 22.1: line at the top	$f(\mathbf{x}_r)$	$f(\mathbf{x}_s)$
183	line 14	which, $E(\mathbf{x}^*) = 0$.	which is $E(\mathbf{x}^*) = 0$.
228	line 17	about the x-axis	about the z-axis
289	line 8 from bottom	$y(0) = Y_0$, $\dot{y}(0) = Y_1$.	$y(0) = y_0$, $\dot{y}(0) = y_1$.
306	line 13	a function	a piecewise continuous function
321	last line	$\lambda \mathbf{x}_1 e^{\lambda t} + \cdots$	$c_1 \lambda \mathbf{x}_1 e^{\lambda t} + \cdots$
436	line 15	Range: R^3	Co-domain: R^3
453	line 12	(b) $(-0.5652, 0.570, 1.5652)$	(b) $(-0.5652, 0.0570, 1.5652)$
455	lines 12-13	Points $P(12, 13.3)$ and $Q(10.3, 18)$ are KKT points, while point $R(12, 18)$ is not.	Point $P(12, 13.3)$ is a KKT point, while points $Q(10.3, 18)$ and $R(12, 18)$ are not.
456	lines 9 and 10 line 10 line 11	$\sqrt{(c_i - \lambda_1)^2 + \lambda_2^2}$ $y_i = -\frac{c_i - \lambda_1}{r_i}$ $\mathbf{h}(\mathbf{x}(\boldsymbol{\lambda}))$	$\sqrt{(c_i + \lambda_1)^2 + \lambda_2^2}$ $y_i = -\frac{l(c_i + \lambda_1)}{r_i}$ $\mathbf{h}(\mathbf{y}(\boldsymbol{\lambda}))$
457	line 1	$(-2.7143, 5.5715)$	$(-2.7143, -5.5715)$
458	line 3 from bottom	$f(\mathbf{x}_{k+1})$ violates	$\mathbf{x}_{k+1}$ violates
462	line 5 from bottom	$-\frac{hk}{45}\left[h^4 \frac{\partial^2 f}{\partial x^2}(\xi_1, \eta_1) + k^4 \frac{\partial^2 f}{\partial y^2}(\xi_2, \eta_2)\right]$ for some $\xi \in [x_0, x_2], \eta \in [y_0, y_2]$.	$-\frac{hk}{45}\left[h^4 \frac{\partial^4 f}{\partial x^4}(\xi_1, \eta_1) + k^4 \frac{\partial^4 f}{\partial y^4}(\xi_2, \eta_2)\right]$ for some $\xi_1, \xi_2 \in [x_0, x_2], \eta_1, \eta_2 \in [y_0,$
467	line 4 from bottom	$S(t) = \int_0^t R(\tau) dt$	$S(t) = \int_0^t R(\tau) d\tau$
470	line 20 line 21	$y = \csc \frac{\nu\pi}{4}\left[1 - \frac{1}{\sqrt{2}(\nu^2-1)}\right] + \frac{\sin x}{\nu^2-1}$ otherwise no solution,	$y = \csc \frac{\nu\pi}{4}\left[1 - \frac{1}{\sqrt{2}(\nu^2-1)}\right] \sin \nu x +$ otherwise $y = \frac{\sin x}{\nu^2-1}$ (unique),
476	line 8 from bottom	$y = \cos(n \cos^{-1} x)$, $y = \cos(n \cos^{-1} x)$.	$y = \cos(n \cos^{-1} x)$, $y = \sin(n \cos^{-1} x)$
488	line 4	all real, but not isolated.	all real and isolated, apart from $z =$