Rank-Deficient and Discrete Ill-Posed Problems

List of Misprints and Corrections as of March 27, 2011

Misprints in both first and second printing.

Page 59, Eq. (3.37), replace $\begin{pmatrix} R_{11}^{-1} & 0 \\ 0 & 0 \end{pmatrix}^{\dagger}$ with $\begin{pmatrix} R_{11}^{-1} & 0 \\ 0 & 0 \end{pmatrix}$.

Page 83, Eq. (4.34), change $u_i^T b$ to $u_j^T b$.

Page 86, line 4 from bottom, change

$$\sigma_0^2 \left(\sum_{i=1}^{p} \frac{\gamma_i}{\gamma_i^2 + \lambda^2} \right)^2 \qquad \text{to} \qquad \sigma_0^2 \sum_{i=1}^{p} \left(\frac{\gamma_i}{\gamma_i^2 + \lambda^2} \right)^2$$

Page 87, line 6 from top, change $\ell\sigma_0/(s\lambda)$ to $\ell\sigma_0/(2\lambda)$.

Page 95, line 1 below figure caption, change 10^{-1} to $5 \cdot 10^{-3}$.

Page 102, a "0" is missing in the illustration of the annihilation process:

$$\begin{array}{l}
\rightarrow \\
\\
\\
\rightarrow \\
\\
\\
\\
\end{array}
\begin{pmatrix}
x & x & & \\
 & x & x & \\
 & & x & x \\
 & & & x \\
x & & & \\
 & x & & \\
 & & x & \\
 & & & x
\end{pmatrix}
\begin{array}{l}
\\
\\
\\
\rightarrow \\
\rightarrow \\
\\
\\
\\
\end{array}
\begin{pmatrix}
* & * & & \\
 & x & x & \\
 & & x & x \\
 & & & x \\
0 & * & & \\
 & x & & \\
 & & x & \\
 & & & x
\end{pmatrix}
\begin{array}{l}
\rightarrow \\
\\
\\
\\
\\
\rightarrow \\
\\
\\
\end{array}
\begin{pmatrix}
x & x & & \\
 & x & x & \\
 & & x & x \\
 & & & x \\
 & 0 & & \\
 & * & & \\
 & & x & \\
 & & & x
\end{pmatrix}
\begin{array}{l}
\\
\\
\\
\rightarrow \\
\rightarrow \\
\\
\\
\\
\end{array}
\begin{pmatrix}
x & x & & \\
 & * & * & \\
 & & x & x \\
 & & & x \\
 & 0 & * & \\
 & & x & \\
 & & & x
\end{pmatrix} \cdots$$

Page 147, caption for Fig. 6.2, change σ_i to σ_i^2.

Page 184, line 1 below Eq. (7.17), change "Fig. 7.2 (p. 196)" to "Fig. 7.1 (p. 194)".

Page 213, line 16 from bottom, change "$s_i = ih_s$, $t_i = ih_t$" to "$s_i = c + ih_s$, $t_i = a + ih_t$".

Misprints only in first printing

Page 8, line 17 from top: change $0, \ldots, q$ to $0, \ldots, p$.

Page 38, lines 14–16: replace "A suite of [...] from the author." with "A MATLAB package with routines for computing and modifying rank-revealing decompositions, called UTV TOOLS, was published in [379]."

Page 43, Eq. (2.52): change $\|A\|_F$ to $\|A\|_F^2$.

Page 54, line 6 from bottom: change $\|AT - A^{\text{exact}}\|_2$ to $\|AT - A^{\text{exact}}\|_F$.

Page 70, the displayed equation should read: $\mathcal{E}\big(|u_i^T e|^2\big) = \sigma_0^2, \qquad i = 1, \ldots, n$.

Page 71, line 12 from top: change $(u_i^T b)/\sigma_i$ to $(u_i^T e)/\sigma_i$.
Line 13 from top: change $|u_{i_b}^T b|/\sigma_i$ to $|u_{i_b}^T e|/\sigma_i$.

Page 87, displayed equation: replace the square root by $\sigma_0\sqrt{m-n+p}$.

Page 97: the top displayed equation should be replaced by two displayed equations:

$$\hat{q}_1 = \begin{pmatrix} \text{ones}(21,1) \\ \text{zeros}(22,1) \\ \text{zeros}(21,1) \end{pmatrix}, \qquad \hat{q}_2 = \begin{pmatrix} \text{zeros}(21,1) \\ \text{ones}(22,1) \\ \text{zeros}(21,1) \end{pmatrix}, \qquad \hat{q}_3 = \begin{pmatrix} \text{zeros}(21,1) \\ \text{zeros}(22,1) \\ \text{ones}(21,1) \end{pmatrix},$$

$$q_1 = \hat{q}_1/\|\hat{q}_1\|_2 \ , \qquad q_2 = \hat{q}_2/\|\hat{q}_2\|_2 \ , \qquad q_3 = \hat{q}_3/\|\hat{q}_3\|_2 \ ,$$

Page 117, line 5 from top: change $\mathbb{R}^{m\times n}$ and $\mathbb{R}^n$ to $\mathbb{R}^{m\times p}$ and $\mathbb{R}^p$.

Page 120, Eq. (5.62) should read

$$\mathcal{J}_{\text{TV}}(u) = \int_\Omega |\nabla u| \, d\Omega \ , \qquad |\nabla u| = \big((\partial u/\partial x)^2 + (\partial u/\partial y)^2\big)^{1/2}$$

Page 121, line 16 from bottom, change "discontinuitites" to "constant pieces."

Page 184, line 18 from bottom: change $n \to \infty$ to $m \to \infty$.

Page 209, first line: change Version 3.0 to Version 3.1.

Page 211, bottom table: change lsqr and plsqr to lsqr_b and plsqr_b.

Page 217, reference [33]: ACM Trans. Math. Software, 24 (1998), pp. 226–253.

Page 218, reference [39]: SIAM J. Matrix Anal. Appl., 19 (1998), pp. 720–736.

Page 221, reference [78] should read: A. Dax and L. Eldén, *Approximating minimum norm solutions of rank-deficient least squares problems*, Numer. Lin. Alg. Appl., 5 (1998), pp. 79–99.

Page 226, reference [145] should read: G. H. Golub, P. C. Hansen & D. P. O'Leary, *Tikhonov regularization and total least squares*, SIAM J. Matrix Anal. Appl., 21 (2000), pp. 185–194.

Page 229, reference [190] should read: P. C. Hansen, *Rank-deficient prewhitening with quotient SVD and ULV decompositions*, BIT, 38 (1998), pp. 34–43. Reference [194]: IEEE Trans. Signal Proc., 46 (1998), pp. 1737–1741.

Page 231, reference [222]: J. Comp. Graph. Statistics, 6 (1997), pp. 451–463.

Page 234, reference [258]: SIAM J. Sci. Comput., 19 (1998), pp. 1063–1082.

Page 242, add new reference [379]: R. D. Fierro, P. C. Hansen and P. S. K. Hansen, *UTV Tools: Matlab templates for rank-revealing UTV decompositions*, Numer. Algo., 20 (1999), pp. 165–194.