Corrections and Summary:

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Nonsmooth Equations in Optimization - Regularity, Calculus, Methods and Applications, Kluwer Academic Publishers, Dordrecht/Boston/London, May 2002, Series Nonconvex Optimization and Its Applications, Volume 60, ISBN 1-4020-0550-4, Hardbound, 360 pages.

Corrections (updated 12 December 2002)

We do not mention those typos in the book which are of trivial nature and do not lead to misunderstandings.

Page 23. Proposition of Theorem 2.4: *Then the function* $q(x) = \max\{p_S(x), p_\Gamma(x)\}$ *(2.12) fulfills* $q \mathrel{\hat{=}} \Sigma(y^0, z^0, X^0)$.

Page 25. Lines 17 from below, write: $H(z) = S(y^0) \cap T(z) = \emptyset$.

Page 115. Subsection 6.4.1 *Chain rules for* Tf *and* Cf *with* $f \in C^{0,1}$, in the general assumptions: $g : \mathbb{R}^n \to \mathbb{R}^m$ and $f : \mathbb{R}^m \to \mathbb{R}^p$ are locally Lipschitz.

Pages 118-119. Last lines of page 118 and first lines of page 119, the correct definition of A_1 is

$$A_1 = \int_0^1 D_g h(\xi^k, g(y) + s[g(\eta^k) - g(y)])\,[\eta^k - y]\,ds,$$

similarly, for A_2, B_1, B_2. Further, line 9 of page 119, write $\|c^k\| \le t_k^{-1}(\|A\| + \|B\|)$.

Page 128. Proof of Lemma 6.17 *Euclidean norm:* If $0 \ne A : \mathbb{R}^n \to \mathbb{R}^m$, choose the sets U^s to be the preimages of the open orthants of $\mathbb{R}^m$ under A, and let $f^s = f$ for each s. The rest of the proof remains.

Page 130. Line 5, write: $\dots \sup_{0<t<1} \dots$ instead of $\dots \sup_{0\le t\le 1} \dots$.

Pages 229-230. In the last line of page 229 and in the second line of page 230, φ_0 has to be replaced by φ.

Page 230. Line 3 from below: Clearly, the master is interested in (stationary) points where $D\varphi(a,b) = 0$.

Pages 236, 262. In the formulas (9.6) and (10.12) and their following passages, $z_i(x)$ means the pair $z_i(x) = (u_i(x), v_i(x))$.

Page 260. Line 9, the correct reference is: "(see Lemma A2)".

Page 262. In the "weighted equation" (10.14), the second expression in the first equation has to be corrected as follows: $\dots + G_t^i(v_i(x) + R_i v(x) w) = \dots$

Page 265. Line 8, the correct reference is: "(... g in Section 9.2)".

Page 308. In the line following the formula (A.11), $I^0(y)$ has to be *by definition* a subset of $I(\bar{x})$ since y is a multiplier according to the standard KKT system.

Further corrections (updated 10 December 2009)

Page 109. Line 4 from below, correct: We consider the statements (iii).

Page 132. Lines 4-5, correct: ... and Theorem 6.6.

Page 162. The definition in formula (7.33) is not correct, since e.g. for $(\alpha, \beta) \in \mathcal{J}_T(y^0)$ (similarly for $(\alpha, \beta) \in \mathcal{J}_C(y^0)$) and for i with $y_i^0 < 0$ and $v_i = 0$, one has by definition (7.33) that $r_i = 1$, but one needs $r_i = 0$. The correct definition is more involved:

$$v = \alpha + \beta, \quad r_i = \alpha_i / v_i \text{ if } v_i \ne 0, \quad r_i = \begin{cases} 1 & \text{if } v_i = 0,\ y_i^0 \ge 0, \\ 0 & \text{if } v_i = 0,\ y_i^0 < 0. \end{cases} \tag{7.33}$$

Page 171. Corollary 7.13, line 3 of its formulation, new, since R was not defined: ... Suppose that $M \in C^1$, and let $R = \mathcal{R}_T(y^0)$.

Page 177. Line before Subsection 7.4.3, correct: ... we refer to Section 9.2.

Page 189. Line 2, correct: ... if and only if $0 \notin TF(s^0, t^0)(u, 0)$ holds ...

Page 225. Last line, first letter is θ instead of t: $\theta^{-1}\|o_1(\theta)\| \downarrow 0$ as $\theta \downarrow 0$ uniformly for $\tau \in B$.

Page 229. Lines 15-17, correct assumption (without 'again' and with differentiability of D_tF): To do this we suppose that

s^0 is a strongly regular critical point of (P)(0,0),
and D_tF is continuously differentiable near $(s^0, 0)$.

Page 229. Line 7 from below, correct: $\Omega \cap S(\theta\pi + o_1(\theta))$ ...

Page 253. Line 5, correct: ... Section 8.3.

Page 308. Line 7, in defining $A^J(\bar{x})$ replace $\alpha_i(x) \geq 0$ by $\alpha_i \geq 0$.

Summary

The book establishes links between regularity and derivative concepts of nonsmooth analysis and the studies of solution methods and stability for optimization, complementarity and equilibrium problems. In developing necessary tools, it presents, in particular,

- an extended analysis of Lipschitz functions and the calculus of their generalized derivatives, including regularity, successive approximation and implicit functions for multivalued mappings,
- a unified theory of Lipschitzian critical points in optimization and other variational problems, with relations to reformulations by penalty, barrier and NCP functions,
- an analysis of generalized Newton methods based on linear and nonlinear approximations,
- the interpretation of hypotheses, generalized derivatives and solution methods in terms of original data and quadratic approximations,
- a rich collection of instructive examples and exercises.

It is written for researchers, graduate students and practitioners in various fields of applied mathematics, engineering, OR and economics, but also for university teachers and advanced students who wish to get insights into problems, potentials and recent developments of this area.

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