Corrigendum

JÜRGEN GUDDAT, LUKA NERALIĆ AND OLIVER STEIN, *Sensitivity analysis of the proportionate change of a subset of outputs or/and inputs in DEA*

[Mathematical Communications **11**(2006), 187-201.]

The beginning of subsection 2.1 on page 188 should read:

2.1. Let us suppose that there are n Decision Making Units (DMUs) with m inputs and s outputs. Let x_{ij} be the observed amount of ith type of input of the jth DMU ($x_{ij} > 0,\ i = 1, 2, \ldots, m,\ j = 1, 2, \ldots, n$) and let y_{rj} be the observed amount of output of the rth type for the jth DMU ($y_{rj} > 0,\ r = 1, 2, \ldots, s,\ j = 1, 2, \ldots, n$). Let $Y_j,\ X_j$ be the observed vectors of outputs and inputs of the DMU_j, respectively, $j = 1, 2, \ldots, n$. Let e be the column vector of ones and let T as a superscript denote the transpose. In order to see if the $\mathrm{DMU}_{j0} = \mathrm{DMU}_0$ is efficient according to the CCR ratio model the following linear programming problem should be solved:

$$\min 0\lambda_1 + \cdots + 0\lambda_0 + \cdots + 0\lambda_n - \varepsilon e^T s^+ - \varepsilon e^T s^- + \theta$$

subject to

$$\begin{array}{rcccccl} Y_1\lambda_1 + \cdots + Y_0\lambda_0 + \cdots + Y_n\lambda_n & - & s^+ & & & = & Y_0 \\ -X_1\lambda_1 - \cdots - X_0\lambda_0 - \cdots - X_n\lambda_n & - & s^- & + & X_0\theta & = & 0 \\ \lambda_1, \quad \ldots, & & \lambda_n, & s^+, & s^- & \geq & 0, \end{array} \tag{1}$$

with $Y_0 = Y_{j_0}, X_0 = X_{j_0}, \lambda_0 = \lambda_{j_0}$ and θ unconstrained.

NEW DOCTORAL DEGREES

IN THE DEPARTMENT OF MATHEMATICS
UNIVERSITY OF OSIJEK

Dr. Kristian Sabo received his PhD in Mathematics from the Department of Mathematics of the University of Zagreb on 20 April 2007 with the dissertation entitled "PARAMETER ESTIMATION PROBLEM IN SOME CHEMICAL KINETICS MODELS". (Advisors: Dr. R.Scitovski, Dr. D. Jukić and Dr. M. Marušić)

Abstract

In this dissertation we consider the existence problem of kinetics parameters in some special mathematical models of enzyme kinetics. On the basis of the law of mass action the system of ordinary differential equations is derived by means of which the Michaelis-Menten's model is described. The Michaelis-Menten's model represents one of the most fundamental models of chemical kinetics used for explanation of kinetical properties of many enzymes. In addition to some additional conditions, by applying a quasi-steady-state hypothesis, from the system of differential equations we obtain different functional connections between quantities that can be measured. Functional connections mentioned are crucial for kinetic parameter estimation.

With respect to that, we give the results of kinetics parameters existence (Michaelis-Menten constant and maximal velocity of a chemical reaction). Ordinary least squares and total least square are considered as well as ordinary and total l_p, $(1 < p < \infty)$ approaches.

Moreover, the problem of kinetics parameters existence is solved in the sense of an ordinary least square on the basis of a closed functional connection between time and concentration of a substrate in an enzymatic reaction.

Particularly, one mathematical model used for parameter estimation of initial velocity of an enzymatic reaction is analyzed, as well as the parameter estimation problem in substrate inhibition models.

Finally, for each of the aforementioned models we propose a good initial approximation. A good initial approximation is necessary for a numerical procedure by which the related nonlinear functional is minimized. Moreover, illustrative numerical examples are provided.

Published papers

[1] M. Benšić, **K. Sabo**, *Estimation of a border for a two-dimensional uniform distribution if data are measured with additive error*, Statistics, A Journal of Theoretical and Applied Statistics, accepted for publication, 2007.

[2] K. P. Hadeler, D. Jukić, **K. Sabo**, *Least squares problems for Michaelis Menten kinetics*, Mathematical Methods in the Applied Sciences, accepted for publication, 2007.

[3] M. Benšić, **K. Sabo**, *Estimating the width of a uniform distribution when data are measured with additive normal errors with known variance*, Computational Statistics and Data Analysis, accepted for publication, 2007.

[4] D. Jukić, **K. Sabo**, R. Scitovski, *A review of existence criteria for parameter estimation of the Michaelis-Menten regression model*, Annali dell'Universita' di Ferrara, accepted for publication, 2007.

[5] D. Jukić, **K. Sabo**, R. Scitovski, *Total least squares fitting Michaelis-Menten enzyme kinetic model function*, Journal of Computational and Applied Mathematics, 201(2007), 230-246.

[6] R. Scitovski, G. Kralik, **K. Sabo**, T. Jelen, *A mathematical model of controlling the growth of tissue in pigs*, Appl. Math. Comput., 181(2006), 1126-1138.

[7] **K. Sabo**, A. Baumgartner, *One method for searching the best least squares approximation*, Mathematical Communications - Supplement 1(2001), 63-68.

[8] D. Jukić, R. Scitovski, **K. Sabo**, *Total least squares problem for the Hubbert function*, Proceedings of the Conference on Appl. Mathematics and Scientific Computing, Springer, 2005, pp. 217-233.

[9] D. Jukić, R. Scitovski, A. Baumgartner, **K. Sabo**, *Localization of the least squares estimate*, Proceedings of the 10th International Conference on Operational Research, Trogir, September 22-24, 2004, pp. 165-174.

[10] D. Jukić, **K. Sabo**, G. Bokun, *Least squares problem for the Hubbert function*, Proceedings of the 9th International Conference on Operational Research, Trogir, October 2-4, 2002, pp. 132-145.

[11] R. Scitovski, R. Šalić, K. Petrić, **K. Sabo**, *Optimal allocation of nodes for surface generating*, Proceedings of 19th Int. Conf. Information Tehnology Interfaces, Pula, 1997, pp. 383-408.

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  [2] J. E. Dennis, Jr, R. B. Schnabel, *Numerical Methods for Unconstrained Optimization and Nonlinear Equations*, SIAM, Philadelphia, 1996.
- *Papers in a bound collection:*
  [3] G. A. Watson, *The total approximation problem*, in: *Approximation Theory IV*, (C. K. Chui, L. L. Schumaker and J. D. Ward, Eds.), Academic Press, 1983, 723–728.

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Since its foundation in 1993, the Osijek Mathematical Society has been intensively taking care of education and training of the junior scientific staff in Croatia and abroad for various fields of mathematics. Also since 1993 a scientific mathematical colloquium has been regularly held in Osijek with acknowledged lecturers - scientists coming from Croatian universities and public institutes, but very often also scientists from abroad. In their lectures scientists usually present results of their own research or give an overview of new trends in various fields of mathematics and its applications. In addition to this, in 1996 the journal *Mathematical Communications* was initiated which is in the meantime exchanged with over 100 similar journals all over the world. It is cited in many world-known databases and financially supported by the Ministry of Science, Education and Sports of the Republic of Croatia (see Portal of scientific journals of Croatia: http://hrcak.srce.hr).

In 2001 the Department of Mathematics and the Osijek Mathematical Society started to publish a professional and methodological journal *Osječki matematički list* (*Osijek Mathematical Gazette*) intended for high-school pupils and teachers, as well as Bachelor and Master level students.

Today, in accordance with the new Bologna process, Department of Mathematics carries out a five-year Master of Science programme in mathematics and computer education, a three-year first cycle study programme (Bachelor level) in mathematics and a two-year second cycle study programme (Master level) in mathematics with one of the following branches: financial and business mathematics, mathematics and computer science, mathematical economy and statistics, and industrial and applied mathematics.

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Osijek Mathematical Society

Osijek Mathematical Society is a professional association of mathematicians in the Osijek-Baranya County. It was founded on 14 July 1993 as a branch of the Croatian Mathematical Society.

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