

Estimation of Dispersion in Nonlinear Regression Models with Constraints ^{*}

LUBOMÍR KUBÁČEK¹, EVA TESAŘÍKOVÁ²

¹*Department of Mathematical Analysis and Applications of Mathematics
Faculty of Science, Palacký University
Tomkova 40, 779 00 Olomouc, Czech Republic
e-mail: kubacekl@aix.upol.cz*

²*Department of Algebra and Geometry, Faculty of Science, Palacký University
Tomkova 40, 779 00 Olomouc, Czech Republic
e-mail: tesariko@aix.upol.cz*

(Received April 14, 2004)

Abstract

Dispersion of measurement results is an important parameter that enables us not only to characterize not only accuracy of measurement but enables us also to construct confidence regions and to test statistical hypotheses. In nonlinear regression model the estimator of dispersion is influenced by a curvature of the manifold of the observation vector. The aim of the paper is to find the way how to determine a tolerable level of this curvature.

Key words: Nonlinear regression model, linearization, estimation of dispersion.

2000 Mathematics Subject Classification: 62J05, 62F10

1 Introduction

The frequently used model in regression analysis is $\mathbf{Y} \sim N_n(\mathbf{f}(\boldsymbol{\beta}), \sigma^2 \mathbf{V})$, $\boldsymbol{\beta} \in R^k$ (k -dimensional Euclidean space), where \mathbf{Y} is an n -dimensional normally distributed observation vector, $\mathbf{f}(\boldsymbol{\beta})$ is its mean value, $\boldsymbol{\beta}$ is an unknown k -dimensional parameter, σ^2 is an unknown scalar parameter, $\sigma^2 \in (0, \infty)$, and \mathbf{V} is a known $n \times n$ positive semidefinite matrix.

^{*}Supported by the Council of Czech Government J14/98: 153 100011.