

L₁-test procedures for detection of change

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Abstract: *L₁*-type test procedures for detection of a change in linear models are proposed, their properties are studied under the null hypothesis (no change).

Key words: *L₁*-test procedures, linear models, change point.

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1 Introduction

The problem to detect and to identify changes in statistical models has attracted a number of researchers in the last two decades. Using various principles they have proposed a number of statistical procedures that are sensitive w.r.t. detection of changes, have studied their (mostly) limit properties and, also, have applied to real data sets.

The problem of detection and identification of changes in statistical models is known as the *change point problem* (mostly for case of changes in location models), *disorder problem* or *testing the constancy of regression relationship over time*. These problems arise in a number of applications (economic modelling, quality control, biology, medicine, meteorology and ecology among others).

We shall consider here the following regression model with possible change after an unknown time point m :

$$Y_i = \mathbf{x}_i^T \boldsymbol{\beta} + \mathbf{x}_i \delta_n I\{i > m\} + E_i, \quad i = 1, \dots, n, \quad (1)$$

where $\mathbf{x}_i = (x_{i1}, \dots, x_{ip})^T$, $x_{i1} = 1$, $i = 1, \dots, n$, are known regression vectors, $m (< n)$, $\boldsymbol{\beta} = (\beta_1, \dots, \beta_p)^T$, $\delta_n = (\delta_{n1}, \dots, \delta_{np})^T$ are unknown parameters, E_1, \dots, E_n are i.i.d. random variables with common distribution function F . $I\{A\}$ denotes the indicator of the set A .