

## A simple test for the parametric form of the variance function in nonparametric regression

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**Abstract** In this paper a new test for the parametric form of the variance function in the common nonparametric regression model is proposed which is applicable under very weak smoothness assumptions. The new test is based on an empirical process formed from pseudo residuals, for which weak convergence to a Gaussian process can be established. In the special case of testing for homoscedasticity the limiting process is essentially a Brownian bridge, such that critical values are easily available. The new procedure has three main advantages. First, in contrast to many other methods proposed in the literature, it does not depend directly on a smoothing parameter. Secondly, it can detect local alternatives converging to the null hypothesis at a rate  $n^{-1/2}$ . Thirdly, in contrast to most of the currently available tests, it does not require strong smoothness assumptions regarding the regression and variance function. We also present a simulation study and compare the tests with the procedures that are currently available for this problem and require the same minimal assumptions.

**Keywords** Homoscedasticity · Nonparametric regression · Pseudo residuals · Empirical process · Goodness-of-fit testing · Bootstrap