

A SMOOTHING SPLINE BASED TEST OF MODEL ADEQUACY IN POLYNOMIAL REGRESSION

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Abstract. For the regression model $y_i = f(t_i) + \varepsilon_i$ (ε 's iid $N(0, \sigma^2)$), it is proposed to test the null hypothesis that f is a polynomial of degree less than some given value m . The alternative is that f is such a polynomial plus a scale factor $b^{1/2}$ times an $(m - 1)$ -fold integrated Wiener process. For this problem, it is shown that no uniformly (in b) most powerful test exists, but a locally (at $b = 0$) most powerful test does exist. Derivation and calculation of the test statistic is based on smoothing spline theory. Some approximations of the null distribution of the test statistic for the locally most powerful test are described. An example using real data is shown along with a computing algorithm.

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