Given the rapid development of model building in recent years, the regression model has received considerable attention and played a significant role in statistics. In regression analysis, the usual assumption is that variances of the dependent variable are constant across the data. Sometimes this assumption on the variance function (i.e. homoscedasticity) is not satisfied, and heteroscedasticity is a more realistic assumption that allows the variance of the dependent variable to vary across the data. The practical importance of detecting heteroscedasticity in regression analysis is widely recognized in many applications because efficient inference for the regression function requires unequal variances to be taken into account. In a heteroscedastic regression model, the variance is often taken as a parametric function of the covariates, or the regression mean, etc. The proposal introduces a test procedure to assess the adequacy of fitting a parametric variance function in heteroscedastic regression models. In contrast to classical methods based on residuals, the proposed tests are based on certain minimized $L_2$-distance between a nonparametric variance function estimator and the parametric variance function estimator.

The asymptotic distribution of the test statistic corresponding to the minimum distance estimator under the fixed model is shown to be normal. The asymptotic power of the proposed test against some local nonparametric alternatives is also investigated. Numerical simulation studies are conducted to evaluate the finite sample performance of the test in one dimensional and two dimensional covariate cases.

This proposal also introduces future work in which we anticipate exploring another consistent lack-of-fit test to assess heteroscedasticity in non-linear regression models. This approach is inspired by the ideas of Zheng (1996), Wang & Zhou (2006), and Song & Du (2010) procedures of tests combining the methodology of the conditional moments and nonparametric estimation technique. The newly proposed test is computationally straightforward. Also it is asymptotically normally distributed under the null hypothesis and is more powerful than Wang & Zhou's (2006) test.