

## Goodness-of-fit tests for regression models: the functional data case

Wenceslao González-Manteiga<sup>1</sup>, Juan Cuesta-Albertos<sup>2</sup>, Manuel Febrero-Bande<sup>1</sup>,  
Eduardo García-Portugués<sup>1</sup>

In this talk the topic of the goodness-of-fit for regression models with functional covariates is considered. Although several papers have been published in the last two decades for the checking of regression models, the case where the covariates are functional is quite recent and has become of interest in the last years. We will review the very recent advances in this area and we will propose a new goodness-of-fit test for the null hypothesis of a functional linear model with scalar response. Our test is based on a generalization to the functional framework of a previous one, designed for the goodness-of-fit of regression models with multivariate covariates using random projections. The test statistic is easy to compute using geometrical and matrix arguments, and simple to calibrate in its distribution by a wild bootstrap on the residuals. Some theoretical aspects are derived and the finite sample properties of the test are illustrated by a simulation study. Finally, the test is applied to real data for checking the assumption of the functional linear model and a graphical tool is introduced.

**Keywords:** Functional Data, Goodness-of-fit, Bootstrap/resampling, Statistical computing

**Mathematics Subject Classification 2010:** 62G05, 62G09, 62G10

### Referencias

- [1] E. GARCÍA-PORTUGUÉS, W. GONZÁLEZ-MANTEIGA AND M. FEBRERO-BANDE, A goodness-of-fit for the functional linear model, *Journal of Computational and Graphical Statistics*, 2013.
- [2] L. HORVATH AND P. KOKOSZKA, *Inference for Functional Data With Applications*. Springer, 2012. New York.
- [3] J. O. RAMSAY AND B. W. SILVERMAN, *Functional data analysis*. Springer, 2005. New York.

<sup>1</sup>Department of Statistics and Operations Research  
University of Santiago de Compostela  
Faculty of Mathematics

<sup>2</sup>Department of Mathematics  
University of Cantabria  
Faculty of Sciences