



# Ridge Regression for the Functional Concurrent Model

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Functional Data Analysis (FDA) proposes very good tools to handle data that are functions of some covariate (e.g. time, when dealing with longitudinal data). These tools may allow a better modelling of complex relationships than classical multivariate data analysis would do, as noticed by several authors. There are several models in FDA to study the relationship between two variables. In particular in this paper we are interested in the Functional Concurrent Model (FCM) because all functional linear models can be reduced to this form.

The aim of the paper is to propose an estimator of the unknown function in the FCM. We follow a strictly functional approach and extend the ridge regression method developed in the classical linear case to the functional data framework. We introduce the estimator as well as the general hypotheses considered throughout the paper. We establish asymptotic statistical properties of the estimator and comment the main assumptions that were required. We finally present some simulation trials which show the high accuracy of the estimator in fitting the unknown function, despite a low signal-to-noise ratio.

**Keywords:** ridge regression; functional data; concurrent model; varying coefficient model.