

# GAUSSIAN PROCESS FUNCTIONAL REGRESSION MODELLING FOR BATCH DATA

J. Q. Shi<sup>†1</sup>, B. Wang<sup>1</sup>, R. Murray-Smith<sup>2</sup> and D.M. Titterton<sup>2</sup>

<sup>1</sup>*University of Newcastle, UK;* <sup>2</sup>*University of Glasgow, UK*

<sup>†</sup> E-mail: *j.q.shi@ncl.ac.uk*

A Gaussian process functional regression model is proposed in this paper for the analysis of batch data. Covariance structure and mean structure are considered simultaneously, with the covariance structure modelled by a Gaussian process regression model and the mean structure modelled by a functional regression model. The model allows the inclusion of covariates in both covariance structure and mean structure and then gives a very precise result for curve fitting and prediction. Several applications and simulation studies are reported.

*Key words: Batch data, B-spline, Functional data analysis, Gaussian process regression model, Gaussian process functional regression model, Multiple-step ahead forecasting, Non-parametric curve fitting*