



# Wavelet estimation of the dimensionality of curve time series

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Received: 1 September 2018 / Revised: 27 April 2019 / Published online: 15 July 2019  
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## Abstract

Functional data analysis is ubiquitous in most areas of sciences and engineering. Several paradigms are proposed to deal with the dimensionality problem which is inherent to this type of data. Sparseness, penalization, thresholding, among other principles, have been used to tackle this issue. We discuss here a solution based on a finite-dimensional functional subspace. We employ wavelet representation of random functions to estimate this finite dimension and successfully model a time series of curves. The proposed method is shown to have nice asymptotic properties. Moreover, the wavelet representation permits the use of several bootstrap procedures, and it results in faster computing algorithms. Besides the theoretical and computational properties, some simulation studies and an application to real data are provided.

**Keywords** Aggregate data · Bootstrap testing · Finite dimension · Functional data analysis

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We thank the Associate Editor and two anonymous referees for their insightful comments and suggestions, which significantly improved the manuscript. Rodney V. Fonseca acknowledges FAPESP Grant 2016/24469-6. Aluísio Pinheiro acknowledges FAPESP Grants 2013/00506-1 and 2018/04654-9 and CNPq Grant 309230/2017-9.

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**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s10463-019-00724-4>) contains supplementary material, which is available to authorized users.

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