

# Is the Brownian bridge a good noise model on the boundary of a circle?

Giacomo Aletti<sup>1</sup> · Matteo Ruffini<sup>2</sup>

Received: 9 March 2015 / Revised: 8 June 2015 / Published online: 12 October 2015  
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**Abstract** In this paper, we study periodical stochastic processes, and we define the conditions that are needed by a model to be a good noise model on the circumference. The classes of processes that fit the required conditions are studied together with their expansion in random Fourier series to provide results about their path regularity. Finally, we discuss a simple and flexible parametric model with prescribed regularity that is used in applications, and we prove the asymptotic properties of the maximum likelihood estimates of model parameters.

**Keywords** Fourier transform · Karhunen–Loève’s theorem · Gaussian processes · Periodic processes · Stationary processes · Maximum likelihood

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✉ Matteo Ruffini  
matteo.ruffini87@gmail.com; mruffini@toolsgroup.com  
Giacomo Aletti  
giacomo.aletti@unimi.it

<sup>1</sup> Department of Mathematics “Federico Enriques”, ADAMSS Center, Università degli Studi di Milano, Via Saldini 50, 20131 Milan, Italy

<sup>2</sup> ToolsGroup Spain, C/Diputacin, 303, Ático, 08009 Barcelona, Spain