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NON-LINEAR METHODS IN INFORMATION PROCESSING: MODELLING, NUMERICAL SIMULATION AND APPLICATION

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Abstract. A method of modelling of non-Gaussian random processes is suggested. The approach is based on representing a process under investigation as a response of a non-linear systems, excited by a white Gaussian noise or a fractional Brownian motion. Systems with random structure are used to model processes with are stationary only locally. Fractional stochastic differential equations are used to model processes with long term dependence.
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1 Introduction

Any nonsingular signal processing problem is based on a certain choice of modelling approach related to signal themselves as well as to the interference considered. Diversity of their statistical properties is particularly unlimited and varies from application to application. Evidently, a certain choice of process model is extremely important as it essentially influences the effectiveness and robustness of the processing algorithms.

In numerous applied problems (radar, sonars, speech processing, etc.) signals and interferences are non-Gaussian and significantly non-stationary. Both these circumstances make synthesis of the processing algorithm extremely difficult or even impossible.

Usually the information about statistical features of random processes considered in signal processing are limited by knowledge about the kind of a process typical realization (continuous, continuous with jumps, etc.) and by lower order statistics such as marginal probability density function (PDF) and autocorrelation function (ACF) (or their estimates). While there is a great number of probability densities used in applications [1], only a small