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ABSTRACT

Random variables and stochastic processes are present in various areas, such as physics, engineering, ecology, biology, medicine, psychology, finance, and others. For analysis and simulation, random variables and stochastic processes need to be modeled mathematically, and procedures are required to generate their samples for numerical calculations. Various methods have been developed to model and generate a single random variable based on its probability distribution and a single stochastic process according its probability density and spectral density. Nevertheless, in some problems, multiple correlated random variables or stochastic processes are involved, and representative models and procedures to generate their samples are required. The present paper first gives a brief review of procedures to generate two or more correlated random variables with Gaussian distributions and with a given joint probability density. Then a method is presented to generate two correlated Gaussian white-noise processes. Based on these results, the method of linear filters is proposed to generate two correlated Gaussian processes with spectra of low−pass and single peak shape.

Keywords: Correlated random variables and stochastic processes, Linear filter models, Simulations

1. Introduction

Random variables and stochastic processes are involved in many areas, such as physics, engineering, ecology, biology, medicine, psychology, finance, and other disciplines. For purposes of analysis and simulation, random variables and stochastic processes are required to be properly

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