§1. Introduction

Let us start with some preliminary notations and definitions to explain our problem.

Let $D$ be the space of all $C^\infty$ complex valued functions, each being defined on the real line and vanishing outside of a compact set. We shall consde $D$ as a linear topological space with the Schwarz topology [4]. Any linear continuous functional on $D$ is called a (Schwarz) distribution and the set of all distributions is denoted by $D'$. Let $D(B, P)^{1,1}$ be a probability space. The totality of complex valued random variables with the finite second moment constitutes a Hilbert space $H=L^2(B, P)$ with the following inner roduct:

$$ (X, Y) = E(XY) = \int_\Omega X(\omega) \overline{Y}(\omega) dP(\omega) $$

An $H$-valued continuous linear functional on $D$ is called a second order random distribution [1], [2], [3]. We shall denote with $D'^n$ the totality of second order random distributions.

A second order continuous stochastic process $X(t)$ is regarded as a second order random distribution as

$$ X(\phi) = \int_0^\infty \phi(t) X(t) dt = \lim_{n \to \infty} \sum_{k=-n}^{n} \phi\left(\frac{k}{n}\right) X\left(\frac{k}{n}\right) \frac{1}{n}, \quad \phi \in D, $$

*This work was supported by the Natinal Science Foundation.

1) We assume that $P$ is a complete measure.