

SELECTION PROPERTY OF STRATONOVICH SET-VALUED INTEGRAL

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Abstract. We discuss two different definitions of strong solutions to stochastic inclusion of a Stratonovich type. We investigate a selection property of a set-valued Stratonovich integral. The obtained result can be applied to the investigation of properties of a Stratonovich stochastic inclusion.

Keywords. forward, backward and symmetric integral, time-reversible process, decomposable process, set-valued stochastic integral, Stratonovich inclusion.

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1 Introduction

Number of works have been devoted to the stochastic control theory described by stochastic equations which depend on control parameters. This theory has been naturally connected with the theory of stochastic inclusions (i.e. equations with set-valued operators). An appropriate set-valued model describing such dynamical systems needs some special type of set-valued integrals that generalize stochastic integrals.

Some results dealing with set-valued stochastic integrals can be found in several papers, e.g.: in [9, 11, 13, 14, 15, 16] for Itô type integrals and in [18, 19] for a Stratonovich integral.

In a single-valued case there are some different kinds of consideration of stochastic Stratonovich integrals. Time-reversible stochastic processes is one of the fruitful used methods (see [7, 10, 17, 22, 23, 24]).

In the paper we apply the "time-reversed" method to define a set-valued Stratonovich integral in a proper way and to find a selection property for such a set-valued integral. The obtained result can be helpful to the investigation of properties of a stochastic Stratonovich inclusion.

In the theory of stochastic equations the definition of their solutions can be stated as follows: a process x is a solution to the equation

$$x_t = \int_0^t f(x_\tau) \circ dz_\tau, \quad t \in [0, 1],$$