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# PARTIAL LYAPUNOV STABILITY OF LINEAR STOCHASTIC FUNCTIONAL DIFFERENTIAL EQUATIONS WITH RESPECT TO INITIAL VALUES

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**Abstract.** The concept of partial Lyapunov stability for linear stochastic functional differential equations is introduced and discussed. The study method based on partial input-to-state stability (partial admissibility of pairs of spaces) is outlined and applied to the case of partial stability w.r.t. initial values (internal partial stability). A number of examples is provided showing efficiency of the suggested method.

**Keywords.** Partial stability, stochastic differential equations, aftereffect, semimartingales.

**AMS (MOS) subject classification:** 34K50, 34D20

## 1 Introduction

Partial stability means that only a certain part of variables is Lyapunov stable, while the remaining variables may behavior arbitrarily. According to [20], this problem was formulated by A. M. Lyapunov himself. Among most prominent applications of partial stability are the theory of asymmetric solids (including stabilization of a satellite in its orbit), focusing of particles in electromagnetic fields, partially controlled systems, extinction principles in population dynamics. A huge amount of publications is devoted to the theoretical and practical aspects of partial stability for systems of ordinary differential equations (see e.g. [20] and references therein).

So far, some generalizations have been suggested including partial stability for delay equations and for stochastic ordinary differential equations. The study of partial stability for delay equations was initiated by A. Halanay [4], and somewhat later by C. Corduneanu [3] and G. S. Yudaev [21].

Only a limited number of papers have been published, where partial stability for stochastic differential equations is discussed, and only the case of non-delay equations have been considered. The first attempt is due to V. F. Sharov [18], and the results known so far are summarized in [20, Ch. 7].