THE AVERAGING OF FUZZY LINEAR DIFFERENTIAL INCLUSIONS ON FINITE INTERVAL

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Abstract. In this paper the substantiation of a possibility of application of averaging method on finite interval for linear differential inclusions with the fuzzy right-hand side with a small parameter is considered.

Keywords. Averaging method, fuzzy differential inclusions, R-solution.

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1   Introduction

In 1990 J.P. Aubin [3] and V.A. Baidosov [4,5] introduced differential inclusions with the fuzzy right-hand side. Their approach is based on usual differential inclusions. In 1997 E. Hullermeier [8] introduced the concept of R-solution similarly how it has been done in [15]. Further in [1,2,6,7,10-13] various properties of solutions of fuzzy differential inclusions, and their applications at modeling of various natural-science processes were considered.

   The averaging methods combined with the asymptotic representations (in Poincare sense) began to be applied as the basic constructive tool for solving the complicated problems of analytical dynamics described by the differential equations. The first justifications of averaging principles for nonlinear system were presented by N.N. Krylov, N.N. Bogolyubov and A. Mitropolskii. Throughout the years, many authors have published papers on averaging methods for different kinds of differential systems. In works [16,17] the possibility of application of schemes of full and partial averaging for differential inclusions with the fuzzy right-hand side, containing a small parameter were proved. By proving these theorems the scheme offered by V.A. Plotnikov for a substantiation of schemes of an average of usual differential inclusions [9,18,19] was used. In this work the possibility of application of averaging method for fuzzy linear differential inclusions without passage to reviewing of separate $\alpha-$solutions is proved, i.e. all estimations are spent for R-solution corresponding fuzzy systems.