AVERAGING OF FUZZY DIFFERENTIAL INCLUSIONS WHEN THE AVERAGE OF THE RIGHT-HAND SIDE IS ABSENT

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Abstract. In this article the averaging method for fuzzy differential inclusions in the case when the limit in the averaging method does not exist is considered.

1　Introduction

Many important problems of analytical dynamics are described by nonlinear differential or integro - differential equations. The absence of exact universal research methods for nonlinear systems caused the development of numerous approximate analytic and numerically-analytic methods that can be realized in effective computer algorithms.

All those methods are based on an iterative principle, i.e. either consecutive approximations of phase variables or functional series with members decreasing on size are used. It means that after the initial approximation is chosen then the additives of various order are found using iterations to approach the true solution. This approach is especially effective in investigation of the mathematical models described by nonlinear equations with small parameters. Also there exist various methods of the initial approximation choice: solving of some linear problem (the linearization method) or solving of some nonlinear but significantly easier system (often the averaging method).

Recently, 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. It became possible due to the works of N.N. Bogolyubov, Yu.A. Mitropolskij, A.M. Samojlenko, V.M. Volosov, E.A. Grebennikov, M.A. Krasnoselskiy, S.G. Krein, A.N. Filatov, etc. The application of the averaging method to optimal control problems was considered in the works of N.N. Moiseev, V.N. Lebedev, F.L. Chernousko, L.D. Akulenko, V.A. Plotnikov, etc.