One method of mapping nonlinear systems to linear

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We consider the problems of searching for admissible control, such that the given initial point passes to a given finite value at a given time due to a system with a nonlinear right-hand side.

We study the possibility of replacing variables, as proposed for triangular systems, to systems that are not triangular. We consider several cases: systems which are non-linear with respect to the control, two-dimensional systems in which the first equation does not depend on the second coordinate, and systems in which the right-hand side depends only on the control. Various methods were used for constructing the control. For the considered problems, we found the control of two types: in the form of piecewise constant functions and in the form of polynomials.

We considered several examples and found several controls by different methods.

Also, we consider a three-dimensional system, which was studied in connection with the time-optimal problem in the paper by S. Yu. Ignatovich [3]. The applied methods are based on Korobov's theory of triangular systems (the transformation of nonlinear systems into linear ones).

[1] Korobov V. I. The method of controllability function (Russian), R&C Dynamics, M.-Izhevsk, 2007, 576 p.

[2] Korobov V. I., Smortsova T. I. Controllability and stabilization (Ukrainian), Kharkiv: V. N. Karazin Kharkiv National University, 2017, 78 p.

[3] Ignatovich S. Yu. Explicit solution of the time-optimal control problem for one nonlinear three-dimensional system // Visnyk of V.N.Karazin Kharkiv National University, Ser. Mathematics, Applied Mathematics and Mechanics, 2016, V. 83, P. 21-46.