



APPROXIMATION OF THE SET OF INTEGRABLE TRAJECTORIES OF THE CONTROL SYSTEM WITH L_2 NORM CONSTRAINTS ON CONTROL FUNCTIONS

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ABSTRACT. In this paper an approximation of the set of multivariable and L_2 integrable trajectories of the control system described by Urysohn type integral equation is considered. It is assumed that the system is affine with respect to the control vector. The admissible control functions are chosen from the closed ball of the space L_2 , centered at the origin with radius ρ . The set of admissible control functions is replaced, step by step, by the set of controls consisting of a finite number of piecewise-constant control functions. It is proved that under appropriate choosing of the discretization parameters, the set of trajectories generated by a finite number of piecewise-constant control functions is an internal approximation of the set of trajectories.

1. Introduction. One of the important notions of the theory of control systems are the attainable set and the integral funnel concepts of a given system. In the case when the trajectories of the system are continuous functions, the attainable set and the integral funnel of the control system have rather simple geometric interpretations. The attainable set is defined in the space of states and consists of points to which the trajectories of the system arrive at the given instant of time. The integral funnel is considered as a generalization of the integral curve notion from the theory of ordinary differential equations and is defined in the space of positions which consists of the graphs of all possible trajectories of the system. Various topological properties and methods of approximate construction of the attainable sets and the integral funnel have been studied in a vast number of papers (see, e.g., [6, 22, 23] and references therein). One should note the studies that were carried out in the framework of the theory of differential inclusions (see, e.g., [2, 7, 10, 11]). The construction of the attainable sets and integral funnel of the given control system, allows to construct the trajectories with different prescribed properties.

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