Design of PI regulators for dynamic systems with constrained control and fixed endpoints of trajectories

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Abstract: The construction of the automatic operation control for real and complex systems requires the use of new information technologies, it is actually necessary to develop new principles of design the systems with a high level of complexity. In the field of automatic control published works one can find various examples of mathematical formulation and methods for solving optimal control problems [1]. But still, the development of various methods of constructing the PI and PID controllers with the necessary properties is an urgent problem [2].

In this work, the problem of optimal control for time-varying linear systems with fixed endpoints of trajectories is considered. A correspondent quadratic objective functional depends on the control, the state of the object and on its integral. New technique of designing the PI controller for the automatic control systems with box constraints on values of control is proposed. The problem is solved by using Lagrange multipliers of a special type [3].

Keywords: Optimal control problem, box constraints, Lagrange multipliers, PI regulator

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