6 Conclusions

In this work the problem of the mobile tank-type chassis robot's optimal trajectory movement control system design is considered. The proposed system consists of two modules (reference and executive) and has, accordingly, two control loops: the first – position control loop, the second – velocity control loop.

The synthesis of trajectory control loop is based on solving the linear-quadratic optimization problem for tracking error. Its mathematical model is the tangent linearization of the MR's tracking error dynamical system about the reference trajectory. In general case, the control law is a tracking error feedback with time-varying coefficients. Non-stationary nature of the problem is determined by the time-varying values of reference linear and angular velocities of the robot. In such a case when these velocities are constant, the problem becomes stationary and the feedback's coefficients also become time-invariant.

The designing of MR's velocity (linear and angular) control loop is also based on solving the linear-quadratic optimization problem. To simplify this problem, from the point of calculation and implementation of optimal control it is proposed to use its asymptotic approximation obtained by singular perturbation method.

Experimental verification of developed MR's trajectory movement control system was performed on Rover5 robot with tank-type chassis. The results of experiment confirmed the acceptable quality of control system.

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