

**ASYMPTOTIC SOLUTION OF LINEAR-QUADRATIC PROBLEMS WITH
CHEAP CONTROLS OF DIFFERENT COSTS**

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We consider a linear-quadratic optimal control problem with performance index containing different powers of a small parameter at quadratic forms with respect to the control. The problem is transformed to a singularly perturbed optimal control problem with three-tempo state variables in the critical case. An algorithm is proposed for finding terms of the first two orders in the asymptotic expansion of the solution. The algorithm is based on the direct substitution of the postulated asymptotic expansion into the statement of the transformed problem and setting uniquely solvable optimal control problems for the terms of the expansion. An illustrative example is given.

Keywords: linear-quadratic problems, singular perturbations, cheap controls, asymptotic expansions.

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