

## **ASYMPTOTIC SOLUTION OF A SINGULARLY PERTURBED NONLINEAR DISCRETE OPTIMAL CONTROL PROBLEM**

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The paper deals with nonlinear discrete singularly perturbed optimal control problems when the part of state variables is periodical and another part of state variables is fixed in the left point. The asymptotic expansion of the problem is constructed using direct scheme. The asymptotic expansion of the solution of a singularly perturbed nonlinear discrete optimal control problem with another boundary conditions for state variables is constructed as series of non-negative integer powers of a small parameter. The estimates are obtained for the closeness of the approximate solutions to the exact one and it is proved that the values of the minimized functional do not increase when higher-order approximations to the optimal control are used.