Asymptotic expansion of the solution of the nonlocal boundary value problem with initial jumps for singularly perturbed integro-differential equation

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Abstract: This report is devoted to the nonlocal boundary value problem with initial jumps for the integro-differential equation with a small parameters in the highest derivatives [1]:
(1)

$$L_\varepsilon y \equiv \varepsilon^2 y''' + \varepsilon A_0(t) y'' + A_1(t) y' + A_2(t) y = F(t) + \int_0^1 \sum_{i=0}^{1} H_i(t,x) y^{(i)}(x,\varepsilon)dx,$$

with the boundary conditions

$$(2) \qquad y(0,\varepsilon) = \alpha, \quad y'(0,\varepsilon) = \beta, \quad y(1,\varepsilon) = \gamma + \int_0^1 \sum_{i=0}^{1} a_i(x) y^{(i)}(x,\varepsilon)dx,$$

Here $\varepsilon > 0$ is a small parameter, α, β, γ are known constants.

In this paper we consider the case when the roots $\mu_i(t), \quad i = 1,2$ of the additional characteristic equation $\mu^2(t) + A_0(t)\mu(t) + A_1(t) = 0$ have opposite signs. Asymptotic expansion of the solution of the nonlocal boundary value problem with initial jumps for linear singularly perturbed third-order integro-differential equations is constructed with any degree of accuracy with respect to a small parameter.

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