On the Asymptotic Formula for the Solution of Nonlocal Boundary Value Perturbation Problems for Hyperbolic Equations

Allaberen Ashyralyev[1,2,3], Ozgur Yildirim[4]

[1] *Department of Mathematics, Near East University, Nicosia, Mersin, Turkey, and*

[2] *Peoples' Friendship University of Russia (RUDN University), Ul Miklukho Maklaya 6, Moscow 117198, Russia, and*

[3] *Institute of Mathematics and Mathematical Modeling, 050010, Almaty, Kazakhstan*

allaberen.ashyralyev@neu.edu.tr

[4] *Department of Mathematics, Yildiz Technical University, Yurkey*

ozgury@yildiz.edu.tr

Abstract: In the preset paper we consider the nonlocal boundary value perturbation problem

$$\begin{cases} \varepsilon^2 \frac{\partial^2 u(t,x)}{\partial t^2} - \left(a\left(x\right) u_x\left(t,x\right)\right)_x + \delta u(t,x) = f(t,x), \\ 0 < t < T, x \in \left(0,l\right), \\ u(0,x) = \alpha u(T,x) + \varphi\left(x\right), x \in \left[0,l\right], \\ u^{'}(0,x) = \beta u^{'}(T,x) + \psi\left(x\right), x \in \left[0,l\right], \\ u(t,0) = u(t,l), u_x(t,0) = u_x(t,l), 0 \le t \le T, \end{cases}$$

for hyperbolic equation with an arbitrary $\varepsilon \in (0,\infty)$ parameter multiplying the derivative term. An asymptotic formula for the solution of this problem with a small ε parameter is presented.

Keywords: Hyperbolic equations, nonlocal boundary value problem, asymptotic formula.

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