On a method of finding a solution of semi-periodic boundary value problem for hyperbolic equations

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On the $\overline{\Omega} = [0, \omega] \times [0, T]$ is considered the boundary value problem

$$\frac{\partial^2 u}{\partial x \partial t} = A(x,t)\frac{\partial u}{\partial x} + C(x,t)u + f(x,t), u(0,t) = \psi(t), u(x,0) = u(x,T), \quad (1)$$

where $A(x,t), C(x,t)$ matrix of $(n \times n)$ order, $f(x,t)$ n-vector-function in continuous $\overline{\Omega}$, n-vector-function $\psi(t)$ continuously-differentiable in $[0,T]$. Using various methodsthe boundary value problems for systems of hyperbolic equations have been studied by many authors. In [1] the half-periodic boundary value problem for a system of quasi-linear hyperbolic equations with mixed derivative is reduced to an equivalent problem, which consists of a family of periodic boundary value problems for ordinary differential equations and a functional relation. On the basis of the parameterization methods [2] were established coefficient signs of the unique solvability of this problem and propose an algorithm for finding a solution. In the report, based on [1] and the Euler method, the numerical method for finding an approximate solution of problem (1).

Acknowlegment. This work was supported by the grant project 1164/GF4 from the Ministry of Science and Education of the Republic of Kazakhstan.

References

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