ON SOLVABILITY TO PROBLEM FOR SYSTEM OF HYPERBOLIC EQUATIONS WITH PIECEWISE CONSTANT ARGUMENT OF GENERALIZED TYPE

A. T. Assanova (Almaty, Kazakhstan)

Consider on the domain $\Omega = [0,T] \times [0,\omega]$ a nonlocal problem for the system of hyperbolic equations with piecewise-constant argument of generalized type in the following form

$$\frac{\partial^2 u}{\partial t \partial x} = A(t,x)\frac{\partial u}{\partial x} + B(t,x)\frac{\partial u}{\partial t} + A_0(t,x)\frac{\partial u(\gamma(t),x)}{\partial x} +$$

$$+C(t,x)u(t,x) + C_0(t,x)u(\gamma(t),x) + f(t,x), \tag{1}$$

$$P(x)\frac{\partial u(0,x)}{\partial x} + S(x)\frac{\partial u(T,x)}{\partial x} = \varphi(x), \qquad x \in [0,\omega], \tag{2}$$

$$u(t,0) = \psi(t), \qquad t \in [0,T], \tag{3}$$

where $u(t,x) = colon(u_1(t,x),...,u_n(t,x))$ is unknown vector function, the $n \times n$ matrices $A(t,x)$, $B(t,x)$, $C(t,x)$, $A_0(t,x)$, $C_0(t,x)$ and n vector function $f(t,x)$ are continuous on Ω; $\gamma(t) = \zeta_j$ if $t \in [\theta_j, \theta_{j+1})$, $j = \overline{0, N-1}$; $\theta_j \le \zeta_j \le \theta_{j+1}$ for all $j = 0,1,...,N-1$; $0 = \theta_0 < \theta_1 < ... < \theta_{N-1} < \theta_N = T$, the $n \times n$ matrices $P(x)$, $S(x)$ and the n vector function $\varphi(x)$ are continuous on $[0,\omega]$, the n vector function $\psi(t)$ is continuously differentiable on $[0,T]$.

As well-known, the questions of solvability to boundary value problems for differential equations with piecewise constant argument are of great importance and relevance [1]. Differential equations with piecewise-constant argument of generalized type are introduced in the work [2]. Mathematical modeling of real processes often leads to differential equations with piecewise-constant argument of generalized type. This requires the development of novel approaches and methods for solving such problems.

In present communication we study a conditions of solvability to problem for system of hyperbolic equations with piecewise constant argument of generalized type (1)–(3). We develop methods and results in [3] to the nonlocal problem (1)–(3).

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О ТОЧНЫХ РЕШЕНИЯХ ОДНОГО ДИФФЕРЕНЦИАЛЬНОГО УРАВНЕНИЯ В ЧАСТНЫХ ПРОИЗВОДНЫХ ЧЕТВЕРТОГО ПОРЯДКА

Е. Р. Бабич, И. П. Мартынов (Гродно, Беларусь)

В работе [1] рассмотрено дифференциальное уравнение в частных производных

$$\omega\omega_{xxxt} + a\omega_t\omega_{xxx} + b\omega_x\omega_{xxt} + c\omega_{xx}\omega_{xt} = 0. \tag{1}$$

Однако при исследовании уравнения (1) не проанализирован случай, когда $b = = -a, c = 0$. Находясь в данных условиях, получим уравнение

$$\omega\omega_{xxxt} + a(\omega_t\omega_{xxx} - \omega_x\omega_{xxt}) = 0. \tag{2}$$

Легко проверить, что уравнение (2) не допускает полярных разложений.