Problem with Inner-Boundary Shift for String Equation

Attaev A.Kh.

Institute of Applied Mathematics and Automation,
Nalchik, Russia,
attaev.anatoly@yandex.ru

Let Ω be the rectangular domain bounded by lines $x - y = 0$, $x + y = 0$, $x - y = 1$ and $x + y = 1$. In the report we discuss a problem with inner-boundary shift for the string equation, which is a direct generalization of the Goursat problem: *to find a regular solution $u(x, y) \in C(\bar{\Omega})$ of the equation*

$$u_{xx} - u_{yy} = 0,$$

satisfying the boundary conditions

$$u(x, 0) = \tau(x) \qquad (0 \leq x \leq 1)$$

and

$$\alpha(x)u\left(\frac{x}{2}, \frac{x}{2}\right) + \beta(x)u\left(\frac{1}{2}, \frac{1}{2} - x\right) = \gamma(x) \qquad (0 \leq x \leq 1),$$

where $\alpha(x)$, $\beta(x)$, $\tau(x)$ and $\gamma(x)$ are given continuous functions.