**Partial differential equations**

**Homework**

**Task 2. First order partial differential equations**

**Methodical instructions**

In Lecture 1, we considered the characteristic method of solving of first order partial differential equations. Consider the first order partial differential equation

, 0<*x*<*L*, 0<*y*<*M*, (1)

where *a*, *L*, *M* are given constants. If *a*>0, then we can have the boundary conditions

 (2)

or

 (3)

If *a*<0, then we can have the boundary conditions

 (4)

or

, (5)

where *ϕ* and *ψ* are given functions.

**Actions**

1. Using the characteristic methods, find the solution of the problem.
2. Make sure that the result satisfies the given equation and boundary conditions.
3. Explain, where we can have the boundary conditions and where we cannot have it for your concrete equation. And why?

**Table of parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **variant** | ***a*** | **boundary**  **conditions** | ***L*** | ***M*** | *ϕ*(*y*) | *ψ*(*x*) |
| 1 | -1/2 | (5) | π | π/2 | -cos 2*y* | -cos *x* |
| 2 | -2 | (4) | 2 | 1 | cos 2π*y* | cos π*x* |
| 3 | 1/2 | (3) | π/2 | π | -sin *y* | -sin 2*x* |

**Remark**. The variant number for each student remains the same as in the previous task.