A boundary matter for a fifth-order private derivative differential equation with two double and one simple real characteristic

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ABSTRACT
The purpose of the study is to calculate the fifth order private derivative differential equation in a more convenient way.Theoretically poorly studied, these issues are able to be widely used in many issues in mechanics.

Keywords: Fifth Order, Private, Derivative, Real, Boundary, Characteristic, Multiplicity, Simple, Uchkarrali, Two Different, Regulary, Single.

Putting the issue. The characteristic equation of the fifth-order private-dressing differential equation is the appearance of an equation with one triple and two different real roots:

$$\frac{\partial^3}{\partial x^3}\left(U_{xx}-U_{yy}\right)=0$$

comes in a canonical look.

Known (1) the characteristic equation of the equation

$$(dy)^3(dy^2+dx^2)=0$$

in the case of seeing it, we have characteristics in the case of seeing $y=const,\ \ y-x=c_1,\ y+x=c_2$. We will outline the universal solution.

Then (1) equation. To do this, (1) if we integrate the X-axis side three times by x

$$U_{xx}-U_{yy}=\omega_1(y)+\omega_2(y)x+\omega_3(y)x^2$$

Or

$$\left(\frac{\partial}{\partial x}-\frac{\partial}{\partial x}\right)\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial x}\right)U =\omega_1(y)+\omega_2(y)x+\omega_3(y)x^3$$

we will have. At the end ξ=x-y, η=x+y if that replacement do well

$$\frac{\partial}{\partial x}=\xi_x\frac{\partial}{\partial \xi}+\eta_x\frac{\partial}{\partial \eta}=\frac{\partial}{\partial \xi}+\frac{\partial}{\partial \eta}$$
$$\frac{\partial}{\partial y}=\xi_y\frac{\partial}{\partial \xi}+\eta_y\frac{\partial}{\partial \eta}=\frac{\partial}{\partial \xi}+\frac{\partial}{\partial \eta}$$

If we take into account that

$$4\frac{\partial^2 U}{\partial\xi\partial\eta}=\omega_1\left(\frac{\eta-\xi}{2}\right)+\omega_2\left(\frac{\eta-\xi}{2}\right)\left(\frac{\eta+\xi}{2}\right)+\omega_2\left(\frac{\eta-\xi}{2}\right)\left(\frac{\eta+\xi}{2}\right)^2$$

we will have. Then we return the integrals x and y variables by ξ and η variables

$U(x,y) = f_1(x-y) + f_2(x+y) + \omega_1(y) + \omega_2(y)x + \omega_3(y)x^2$ (2)

we form.

Here f1,f2,ω1,ω2,ω3 five times differential optional continuous functions. ω1,ω2, ω3 using the arbitrary number of these functions (2) we write the equation in the following form.

$$U(x,y) = f_1(x-y) + f_2(x+y) + \omega_1(y) + +\omega_2(y)(x-y-1) + \omega_3(y)(x-y-1)^2$$

we write in appearance. Without limiting the generality

$$\omega_j(0) = \omega'_j = 0$$

that may get.

Let's say (1) equation A(-1,0) B(1,0) kesmavaAC: -y-x=0;

BC: let's look at the area D, which is limited by the characteristics of

(1)the equation D is continuous throughout the sphere and follows

$$U|_{AB} = \tau(x), \quad -1 \le x \le 1 \quad \textbf{(5)}$$

$$U_y|_{AB} = \nu(x), \quad -1 \le x < 1 \quad \textbf{(6)}$$

$$U|_{AC} = \psi_1(y), \quad -1 \le y \le 0 \quad \textbf{(7)}$$

$$\frac{\partial U}{\partial n}|_{BC} = \psi_2(y), \ -1 < y < 0\,; \quad \textbf{(8)}$$

$$U|_{BC} = \psi_3(y), \quad -1 \le y \le 0 \quad \textbf{(9)}$$

satisfying the conditions, let it be (x,y) regular solution. Research of the issue.(3) to solve the problem, we use a common solution. (3) if we put the equation (5)-(9) to the conditions then

$$U_x = f'_1(x-y) + f'_2(x+y) + \omega_2(y) \quad +2 \quad \omega_2(y)(x-y-1) \quad \textbf{(10)}$$

$$U_y = f'_1(x-y) + f'_2(x+y) + \omega'_1(y) + \omega'_2(y)(x-y-1) - \omega_2(y) + +\omega'_3(y)(x-y-1)^2 - 2\omega_3(y)(x-y-1) \quad \textbf{(11)}$$

take note that

$$U|_{AB} = U|_{y=0} = f_1(x) + f_2(x) + \omega_1(0) + \omega_2(0)(x-0-1) +$$

$$+\omega_3(0)(x-0-1)^2 = \tau(x), \quad -1 \le x \le 1 \quad \textbf{(12)}$$

$$U_y|_{AB} = U_y|_{y=0} = -f'_1(x) + f'_2(x) + \omega'_1(0) + \omega'_2(0)(x-0-1) -$$

$$-\omega_2(0) + \omega'_3(0)(x-0-1)^2 - 2\omega_3(0)(x-0-1) = \nu(x), \quad -1 \le x \le 1 \quad \textbf{(13)}$$

$$U|_{AB} = U|_{x=-y-1} = f_1(-2y-1) + f_2(-1) + \omega_1(y) + \omega_2(y)(-y-1-y--1) + \omega_3(y)(-y-1-y-1)^2 = f_1(-2y-1) + f_2(-1) + \omega_1(y) - -2\omega_2(y)(y+1) + 4\omega_3(y)(y+1)^2 = \psi_1(y) \quad -1 \le y \le 0 \quad \textbf{(14)}$$

$$\frac{\partial U}{\partial n}|_{BC} = -\frac{1}{\sqrt{2}}\left(U_x - U_y\right)|_{x=1+y} = -\frac{1}{\sqrt{2}}\big[f'_1(x-y) + f'_2(y+x) + \omega_2(y) + +2\omega_3(y)(x-y-1) - f'_1(x-y) - f'_2(y+x) - \omega'_1(y) - \omega'_2(y)(x--y-1) + \omega_2(y) + \omega'_3(y)(x-y-1)^2 - 2\omega_3(y)(x-y-1)\ \big]|_{x=y+1} = -\frac{1}{\sqrt{2}}\left[2f'_1(1) + 2\omega_2(y) - \ \omega'_1(y)\ \right] = \psi_2(y), \quad -1 < y < 0 \quad \textbf{(15)}$$

$$U|_{AB} = U|_{x=1+y} = f_1(1+y-y) + f_2(1+y+y) + \omega_1(y) + \omega_2(y)(1+y-y-1) + \omega_3(y)(1+y-y-1)^2 = f_1(1) + f_2(1+2y) + \omega_1(y) = \psi_3(y), \ -1 < y < 0 \quad \textbf{(16)}$$

Using the first two of the generated equations, we get f1, f2 we'll figure it out.

Adding turns to these equations is taxable, (17) (18) we form the equation. Now from (16) take into account (17), (18), we make we will have

(15) from equality we form.(18), (19) from f ' 1 1 and ω ' 1 we find y.

we put the found ones (20) and get the following equations.
(21) and (13) dan ω3 if we find y and then put the found values of f1,f2,ω1, ω2

(19), (21), (22) we form a common solution by taking the Equations (2) to the equation and putting. 1) from the appearance of ni and (5) – (9) equations, it turns out that the solution of the problem is obvious.

Summary and suggestions. In this article, we have considered the boundary value problem for the fifth order private derivative differential equation, which has two double and one simple real characteristic. There are several types of such equations never seen again. For example, 2 pieces, and 3 pieces are simple, 2 pieces are two, and 1 piece is simple.

It can be used in physics and technical issues and problem solving if such issues are considered.

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