Exact Solutions > Nonlinear Partial Differential Equations > Third-Order Partial Differential Equations (Korteweg-de Vries Equation, Boundary Layer Equations)

5. Third-Order Partial Differential Equations

1.
$$\frac{\partial w}{\partial t} + \frac{\partial^3 w}{\partial x^3} - 6w \frac{\partial w}{\partial x} = 0$$
. Korteweg-de Vries equation.

2.
$$\frac{\partial w}{\partial t} + \frac{\partial^3 w}{\partial x^3} - 6w \frac{\partial w}{\partial x} + \frac{1}{2t}w = 0$$
. Cylindrical Korteweg-de Vries equation.

3.
$$\frac{\partial w}{\partial t} + \frac{\partial^3 w}{\partial x^3} + 6\sigma w^2 \frac{\partial w}{\partial x} = 0$$
. Modified Korteweg-de Vries equation.

4.
$$\frac{\partial w}{\partial t} + \frac{\partial^3 w}{\partial x^3} + f(w) \frac{\partial w}{\partial x} = 0$$
. Generalized Korteweg-de Vries equation.

5.
$$\frac{\partial w}{\partial y} \frac{\partial^2 w}{\partial x \partial y} - \frac{\partial w}{\partial x} \frac{\partial^2 w}{\partial y^2} = \nu \frac{\partial^3 w}{\partial y^3}.$$
 Hydrodynamic boundary layer equation.

6.
$$\frac{\partial w}{\partial y} \frac{\partial^2 w}{\partial x \partial y} - \frac{\partial w}{\partial x} \frac{\partial^2 w}{\partial y^2} = \nu \frac{\partial^3 w}{\partial y^3} + f(x).$$
Boundary layer equation with pressure gradient.

The EqWorld website presents extensive information on solutions to various classes of ordinary differential equations, partial differential equations, integral equations, functional equations, and other mathematical equations.

Copyright © 2004–2005 Andrei D. Polyanin

http://eqworld.ipmnet.ru/en/solutions/npde/npde-toc5.pdf