1. $\left(\dfrac{\partial^2 w}{\partial x \partial y}\right)^2 - \dfrac{\partial^2 w}{\partial x^2}\dfrac{\partial^2 w}{\partial y^2} = 0.$

Homogeneous Monge–Ampere equation (Monge–Ampère Equation).

1°. General solution in parametric form:

$$w = tx + \varphi(t)y + \psi(t),$$
$$x + \varphi'(t)y + \psi'(t) = 0,$$

where t is the parameter, and $\varphi = \varphi(t)$ and $\psi = \psi(t)$ are arbitrary functions.

2°. Solutions involving one arbitrary function:

$$w(x,y) = \varphi(C_1x + C_2y) + C_3x + C_4y + C_5,$$
$$w(x,y) = (C_1x + C_2y)\varphi\left(\frac{y}{x}\right) + C_3x + C_4y + C_5,$$
$$w(x,y) = (C_1x + C_2y + C_3)\varphi\left(\frac{C_4x + C_5y + C_6}{C_1x + C_2y + C_3}\right) + C_7x + C_8y + C_9,$$

where $C_1, \ldots, C_9$ are arbitrary constants and $\varphi = \varphi(z)$ is an arbitrary function.

See also:

- nonhomogeneous Monge–Ampere equation (special case) ,
- nonhomogeneous Monge–Ampere equation .

References

Goursat, E., *A Course of Mathematical Analysis. Vol 3. Part 1* [Russian translation], Gostekhizdat, Moscow, 1933.

Khabirov, S. V., Nonisentropic one-dimensional gas motions obtained with the help of the contact group of the nonhomogeneous Monge–Ampere equation, [in Russian], *Mat. Sbornik*, Vol. 181, No. 12, pp. 1607–1622, 1990.

Ibragimov, N. H. (Editor), *CRC Handbook of Lie Group Analysis of Differential Equations, Vol. 1, Symmetries, Exact Solutions and Conservation Laws*, CRC Press, Boca Raton, 1994.

Polyanin, A. D. and Zaitsev, V. F., *Handbook of Nonlinear Partial Differential Equations* , Chapman & Hall/CRC, Boca Raton, 2004.

