



First-Order Partial Differential Equations > Nonlinear Equations > Section 3.1

$$10. \quad \frac{\partial w}{\partial x} + a \left(\frac{\partial w}{\partial y} \right)^2 + b \frac{\partial w}{\partial y} = f(x)w + g(x).$$

Complete integral:

$$w = (C_1 y + C_2)F(x) + F(x) \int [g(x) - aC_1^2 F^2(x) - bC_1 F(x)] \frac{dx}{F(x)}, \quad F(x) = \exp \left[\int f(x) dx \right],$$

where C_1 and C_2 are arbitrary constants.

Reference

Polyanin, A. D., Zaitsev, V. F., and Moussiaux, A., *Handbook of First Order Partial Differential Equations*, Taylor & Francis, London, 2002.