

First-Order Partial Differential Equations > Quasilinear Equations > Section 2.1

1.
$$\frac{\partial w}{\partial x} + a \frac{\partial w}{\partial y} = f(x)w + g(x)w^k$$
.

General solution:

$$w^{1-k} = F(x)\Phi(y-ax) + (1-k)F(x)\int \frac{g(x)}{F(x)}\,dx, \text{ where } F(x) = \exp\left[(1-k)\int f(x)\,dx\right],$$

 $\Phi(u)$ is an arbitrary function.

Reference

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

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http://eqworld.ipmnet.ru/en/solutions/fpde/fpde2101.pdf