



34. $yy''_{xx} + (y'_x)^2 + f(x)yy'_x + g(x) = 0.$

The substitution $u = y^2$ leads to a linear equation: $u''_{xx} + f(x)u'_x + 2g(x) = 0$. It is reduced to a first-order linear equation by the change of variable $w(x) = u'_x$.

Reference

Polyanin, A. D. and Zaitsev, V. F., *Handbook of Exact Solutions for Ordinary Differential Equations, 2nd Edition*, Chapman & Hall/CRC, Boca Raton, 2003.