Exact Solutions > Systems of Ordinary Differential Equations > Linear Systems of Two Ordinary Differential Equations

1. Linear Systems of Two Ordinary Differential Equations

1.1. Systems of First-Order Ordinary Differential Equations

- 1. $x'_t = ax + by$, $y'_t = cx + dy$.
- 2. $x'_t = a_1x + b_1y + c_1$, $y'_t = a_2x + b_2y + c_2$.
- 3. $x'_t = f(t)x + g(t)y$, $y'_t = g(t)x + f(t)y$.
- 4. $x'_{t} = f(t)x + g(t)y$, $y'_{t} = -g(t)x + f(t)y$.
- 5. $x'_t = f(t)x + g(t)y$, $y'_t = ag(t)x + [f(t) + bg(t)]y$.
- 6. $x'_t = f(t)x + g(t)y$, $y'_t = a[f(t) + ah(t)]x + a[g(t) h(t)]y$.
- 7. $x'_t = f(t)x + g(t)y$, $y'_t = h(t)x + p(t)y$.

1.2. Systems of Second-Order Ordinary Differential Equations

- 8. $x''_{tt} = ax + by$, $y''_{tt} = cx + dy$.
- 9. $x''_{tt} = a_1x + b_1y + c_1$, $y''_{tt} = a_2x + b_2y + c_2$.
- 10. $x''_{tt} ay'_t + bx = 0$, $y''_{tt} + ax'_t + by = 0$.
- 11. $x''_{tt} + a_1 x'_t + b_1 y'_t + c_1 x + d_1 y = k_1 e^{i\omega t}$, $y''_{tt} + a_2 x'_t + b_2 y'_t + c_2 x + d_2 y = k_2 e^{i\omega t}$.
- 12. $x''_{tt} = a(ty'_t y), \quad y''_{tt} = b(tx'_t x).$
- 13. $x_{tt}'' = f(t)(a_1x + b_1y), \quad y_{tt}'' = f(t)(a_2x + b_2y).$
- 14. $x''_{tt} = f(t)(a_1x'_t + b_1y'_t), \quad y''_{tt} = f(t)(a_2x'_t + b_2y'_t).$
- 15. $x''_{tt} = af(t)(ty'_t y), \quad y''_{tt} = bf(t)(tx'_t x).$
- 16. $t^2 x_{tt}'' + a_1 t x_t' + b_1 t y_t' + c_1 x + d_1 y = 0$, $t^2 y_{tt}'' + a_2 t x_t' + b_2 t y_t' + c_2 x + d_2 y = 0$.
- 17. $(\alpha t^2 + \beta t + \gamma)^2 x_{tt}'' = ax + by$, $(\alpha t^2 + \beta t + \gamma)^2 y_{tt}'' = cx + dy$.
- 18. $x_{tt}'' = f(t)(tx_t' x) + g(t)(ty_t' y), \quad y_{tt}'' = h(t)(tx_t' x) + p(t)(ty_t' y).$

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.