



Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

15. $x''_{tt} = x\Phi(x, y, t, x'_t, y'_t), \quad y''_{tt} = y\Phi(x, y, t, x'_t, y'_t).$

1°. First integral:

$$xy'_t - yx'_t = C,$$

where C is an arbitrary constant.

Remark. The function Φ can also depend on the second and higher derivatives with respect to t .

2°. Particular solution: $y = C_1x$, where C_1 is an arbitrary constant, and the function $x = x(t)$ is determined by the original differential equation $x''_{tt} = x\Phi(x, C_1x, t, x'_t, C_1x'_t).$