



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  $\Phi$  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  $x''_{tt} = x\Phi(x, C_1x, t, x'_t, C_1x'_t).$