



Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

$$18. \quad x''_{tt} = x'_t \Phi(x, y, t, x'_t, y'_t) + f(y), \quad y''_{tt} = -y'_t \Phi(x, y, t, x'_t, y'_t) + g(x).$$

First integral:

$$x'_t y'_t - \int f(y) dy - \int g(x) dx = C,$$

where  $C$  is an arbitrary constant.

*Remark.* The function  $\Phi$  can also depend on the second and higher derivatives with respect to  $t$ .