



Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

$$20. \quad x''_{tt} = f(y'_t)\Phi(x, y, t, x'_t, y'_t), \quad y''_{tt} = g(x'_t)\Phi(x, y, t, x'_t, y'_t).$$

First integral:

$$\int g(u) du - \int f(v) dv = C, \quad u = x'_t, \quad v = y'_t,$$

where  $C$  is an arbitrary constant.

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