



Systems of Ordinary Differential Equations > Nonlinear Systems of Two Equations

$$16. \quad x''_{tt} + x^{-3}f(y/x) = x\Phi(x, y, t, x'_t, y'_t), \quad y''_{tt} + y^{-3}g(y/x) = y\Phi(x, y, t, x'_t, y'_t).$$

First integral:

$$\frac{1}{2}(xy'_t - yx'_t)^2 + \int^{y/x} [u^{-3}g(u) - uf(u)] du = C,$$

where C is an arbitrary constant.

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