

Systems of Ordinary Differential Equations > Linear Systems of Two Equations

17.
$$(\alpha t^2 + \beta t + \gamma)^2 x_{tt}'' = ax + by$$
, $(\alpha t^2 + \beta t + \gamma)^2 y_{tt}'' = cx + dy$.

The transformation

$$\tau = \int \frac{dt}{\alpha t^2 + \beta t + \gamma}, \quad u = \frac{x}{\sqrt{|\alpha t^2 + \beta t + \gamma|}}, \quad v = \frac{y}{\sqrt{|\alpha t^2 + \beta t + \gamma|}}$$

leads to a constant coefficient linear system of equations of the form 1.1:

$$u_{\tau\tau}'' = (a - \alpha\gamma + \frac{1}{4}\beta^2)u + bv,$$

$$v_{\tau\tau}'' = cu + (d - \alpha\gamma + \frac{1}{4}\beta^2)v.$$

Copyright © 2004 Andrei D. Polyanin

http://eqworld.ipmnet.ru/en/solutions/sysode/sode0117.pdf