Systems of Ordinary Differential Equations > Linear Systems of Two Equations

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

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:

$$u_{\tau\tau}'' = (a - \alpha\gamma + \tfrac{1}{4}\beta^2)u + bv,$$
$$v_{\tau\tau}'' = cu + (d - \alpha\gamma + \tfrac{1}{4}\beta^2)v.$$