EqWorld

http://eqworld.ipmnet.ru

Exact Solutions > Systems of Ordinary Differential Equations >
Nonlinear Systems of Three or More Ordinary Differential Equations

4. Nonlinear Systems of Three or More Ordinary Differential Equations

1. $ax'_t = (b-c)yz, \quad by'_t = (c-a)zx, \quad cz'_t = (a-b)xy.$

2. $ax'_t = (b-c)yzf(x,y,z,t), \quad by'_t = (c-a)zxf(x,y,z,t), \quad cz'_t = (a-b)xyf(x,y,z,t).$

3. $x'_t = a(y-x), \quad y'_t = bx - y - xz, \quad z'_t = -cz + xy.$ *Lorenz equations.*

4. $x'_t = cF_2 - bF_3, \quad y'_t = aF_3 - cF_1, \quad z'_t = bF_1 - aF_2, \quad$ **where** $F_n = F_n(x,y,z,t).$

5. $x'_t = czF_2 - byF_3, \quad y'_t = axF_3 - czF_1, \quad z'_t = byF_1 - axF_2, \quad$ **where** $F_n = F_n(x,y,z,t).$

6. $x'_t = x(cF_2 - bF_3), \quad y'_t = y(aF_3 - cF_1), \quad z'_t = z(bF_1 - aF_2), \quad$ **where** $F_n = F_n(x,y,z,t).$

7. $x'_t = h(z)F_2 - g(y)F_3, \quad y'_t = f(x)F_3 - h(z)F_1, \quad z'_t = g(y)F_1 - f(x)F_2.$

8. $x''_{tt} = \dfrac{\partial F}{\partial x}, \quad y''_{tt} = \dfrac{\partial F}{\partial y}, \quad z''_{tt} = \dfrac{\partial F}{\partial z}, \quad$ **where** $\quad F = F(r), \quad r = \sqrt{x^2+y^2+z^2}.$

9. $x''_{tt} = xF, \quad y''_{tt} = yF, \quad z''_{tt} = zF, \quad$ **where** $F = F(x,y,z,t,x'_t,y'_t,z'_t).$

10. $x''_{tt} = F_1, \quad y''_{tt} = F_2, \quad z''_{tt} = F_3, \quad$ **where** $F_n = F_n(t, tx'_t - x, ty'_t - y, tz'_t - z).$

11. $x''_{tt} = cF_2 - bF_3, \quad y''_{tt} = aF_3 - cF_1, \quad z''_{tt} = bF_1 - aF_2, \quad$ **where** $F_n = F_n(x,y,z,t,x'_t,y'_t,z'_t).$

The EqWorld website presents extensive information on solutions to various classes of ordinary differential equations, partial differential equations, integral equations, functional equations, and other mathematical equations.

http://eqworld.ipmnet.ru/en/solutions/sysode/sode-toc4.pdf