

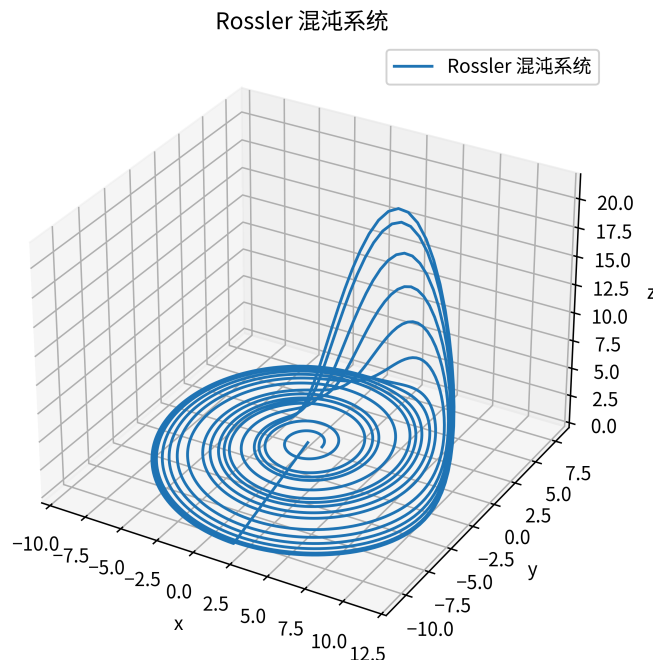
解常微分方程

Rossler混沌系统是一个非线性系统，可以由下面确定的三维非线性方程组来描述：

$$\begin{aligned}\dot{x}_1 &= -wx_2 - x_3 \\ \dot{x}_2 &= wx_1 + ax_2 \\ \dot{x}_3 &= x_3(x_1 - c) + b\end{aligned}$$

其中 w, a, b, c 是系统的三个控制参数。 x_1, x_2, x_3 是系统的状态变量。

当参数取值 $w = 1, a = 0.2, b = 0.2, c = 5.7$ 时，Rossler系统会产生混沌现象。



```
local print = require('package.print').print
local inja = require('package.inja')
local plt = require 'package.plot'
```

```

local mol = libminoptlab

local w,a,b,c = 1,0.2,0.2,5.7

function system(x, t)
    return {-w*x[2]-x[3],w*x[1]+a*x[2],(x[1]-c)*x[3]+b}
end

local x0 = {1,0,0}
local t0 , t1 = 0, 100
local step = 0.01
local is_stiff = false
local odesolver = mol.ode.new(system , x0 , t0 , t1 , step , is_stiff );
local t = mol.linspace(t0 , t1 , 3000)
local x = mol.matrix.new(#t, #x0)
for i = 1, x.nrow do
    for j = 1,x.ncol do
        x:set(i,j,odesolver:get(j, t[i]))
        x:set(i,j,odesolver:get(j, t[i]))
    end
end

end

local img = plt.plot3d('plot', {{x:col(1):tovector(), x:col(2):tovector(),
x:col(3):tovector()}}), {'Rossler 混沌系统'})
local fw = plt.framework3d(111, 'Rossler 混沌系统', {'x', 'y', 'z'})
plt.show({{fw , {img}}})

```

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