

非线性规划

最小化目标函数：

$$f(x) = 5x_1 - 2x_2 + x_3$$

约束条件如下：

$$\begin{aligned}x_1 + x_2 + x_3 &= 1 \\x_1^2 + x_2^2 + x_3^2 &\leq 1 \\-x_1 - x_2 - x_3 &\leq -1 \\x_1 - x_3^2 &\geq 0\end{aligned}$$

其解 $x = [-9.4591001698063e - 12, 0.999999999999627, 0]^T$ ，最小值是 -2.00000000000398 。

```
local print = require('package.print').print
local mol = libminoptlab

function test(x)
    return 5*x[1]-2*x[2]+x[3]
end

function eqcon(x)
    return {x[1]+x[2]+x[3]-1}
end
```

```

function ineqcon(x)
    return {x[1]^2+x[2]^2+x[3]^2-1,x[3]^2-x[1],1-x[1]-x[2]-x[3]}
end

local eps = 1e-5
local n = 2000
local algo = mol.lisoptalgo()[1]

local lb = {}
local ub = {}

for i = 1,3 do
    table.insert(lb,-100)
    table.insert(ub,100)
end

local best,fbest = mol.fmincon(test,lb,ub,eqcon,ineqcon,algo,eps,n)

print({
    best = best,
    fbest = fbest,
    eq = eqcon(best),
    ineq = ineqcon(best)
})

```



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