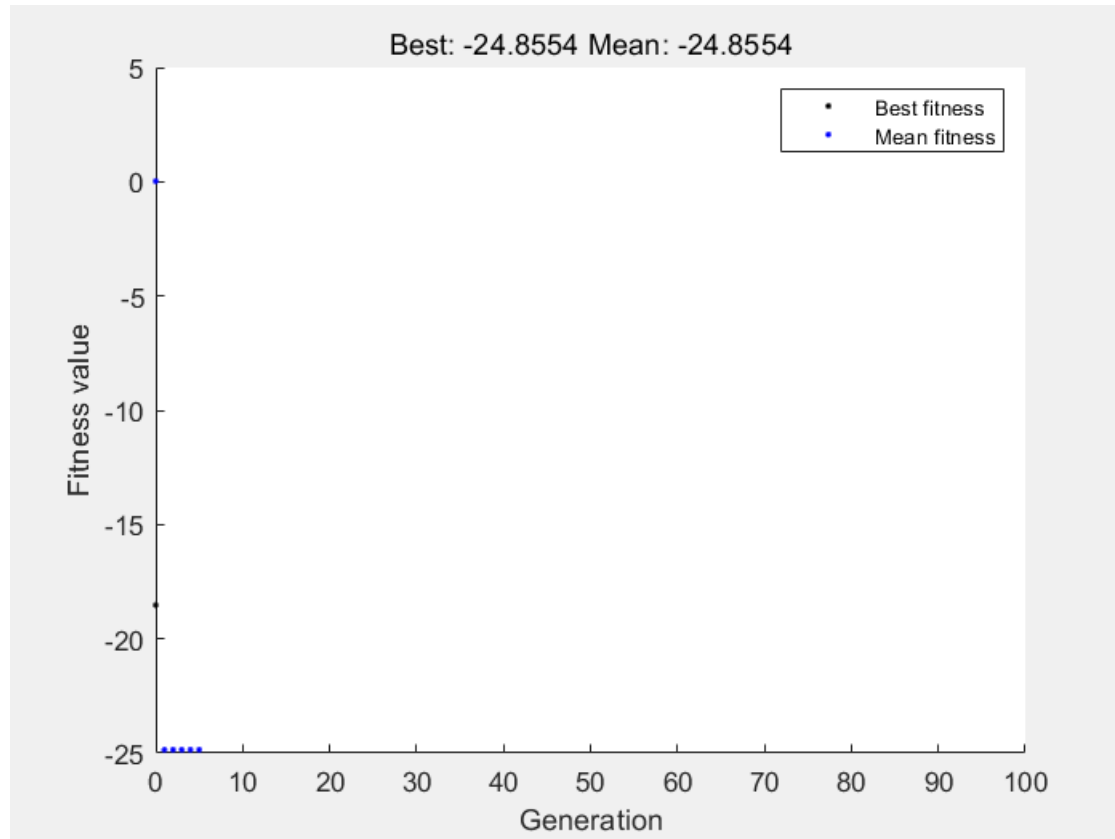# 遗传算法

```matlab
nvars = 1;
A = [];
b = [];
Aeq = [];
beq = [];

x_lb = [];
x_ub = [];

options = optimoptions("ga","PlotFcn","gaplotbestf","HybridFcn","fmincon");
[x, fval, exitflag, output] = ga(@Obj_fun, nvars, A, b, Aeq, beq, x_lb, x_ub, @conditions, opti
```

Optimization terminated: average change in the fitness value less than options.FunctionTolerance
 and constraint violation is less than options.ConstraintTolerance.



```matlab
fval = -fval;
x, fval
```

```
x = 7.8567
fval = 24.8554
```

# 函数定义

```matlab
function y = Obj_fun(x)
    y = x + 10 * sin(5 * x) + 7 * cos(4 * x);
    y = -y;
end
```

```matlab
function [c, ceq] = conditions(x)
    % 表示 c <= 0, ceq = 0
%       c(1) = x(1)^2 + x(2)^2 + x(3)^2;
%       c(2) = 2*x(1)^2 + x(2)^2;
    c = [];
    ceq = [];
end
```