

LinkedIn Group “Simulia iSight Optimization”

Example #1 Minimization of Rosenbrock function using DownhillSimplex and Calculator component.

The optimization problem is formulated as follows

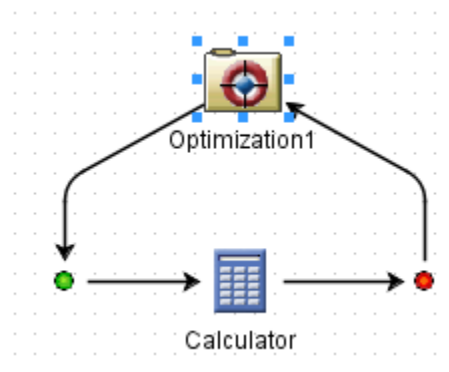
$$\text{Min } f(x, y) = (1 - x)^2 + 100 \times (y - x^2)^2$$

$$\text{s.t. } x \in [-3, 3],$$

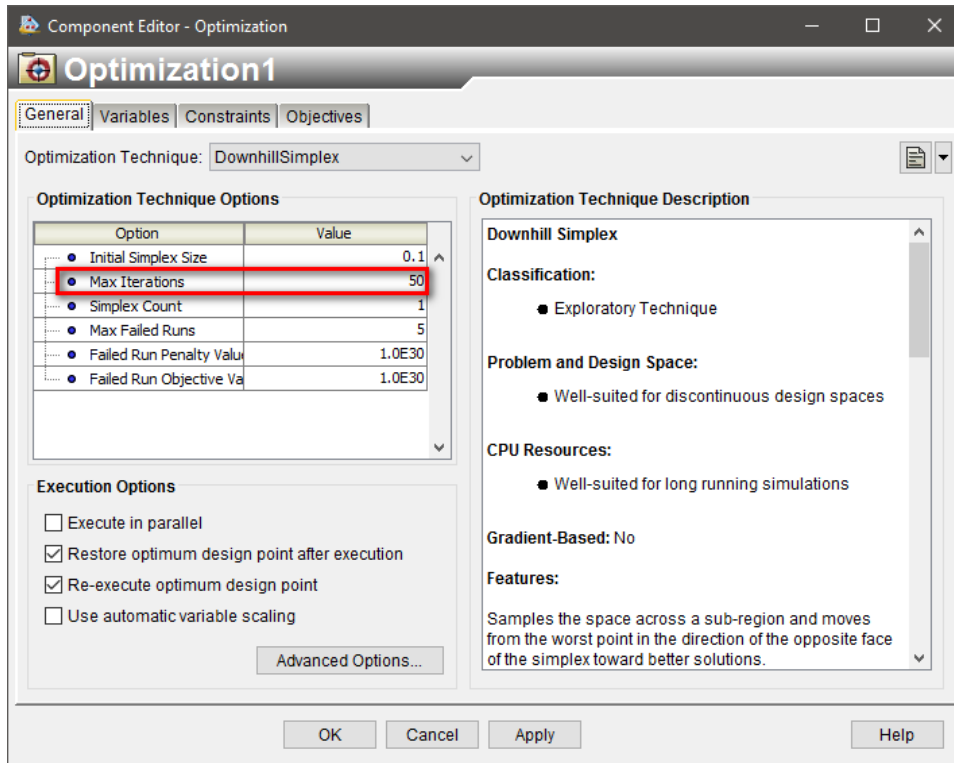
$$y \in [-3, 3].$$

Solution:

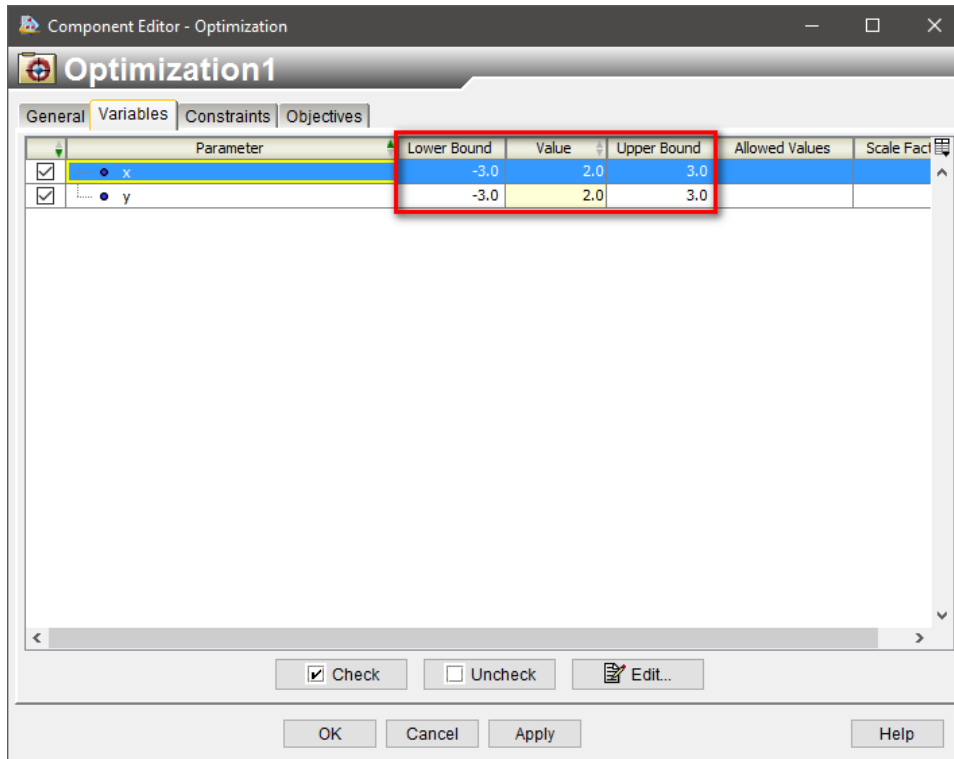
Next we create simple iSight flow with only 2 components: Optimization and Calculator.



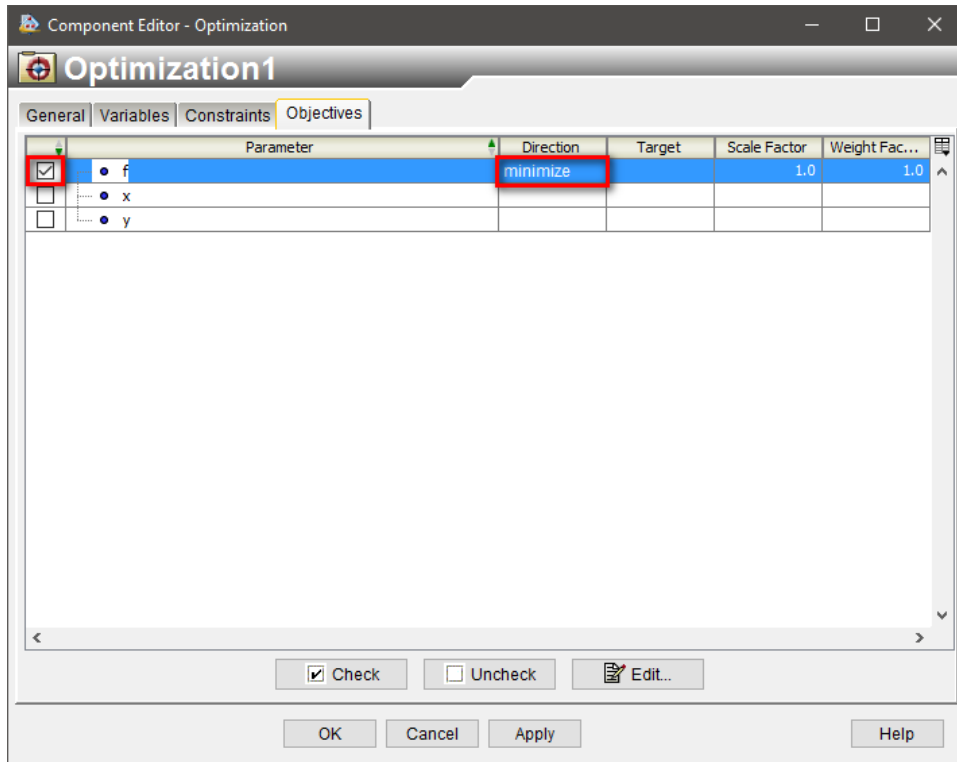
As an optimizer we select DownhillSimplex, and set Max Iterations = 50.



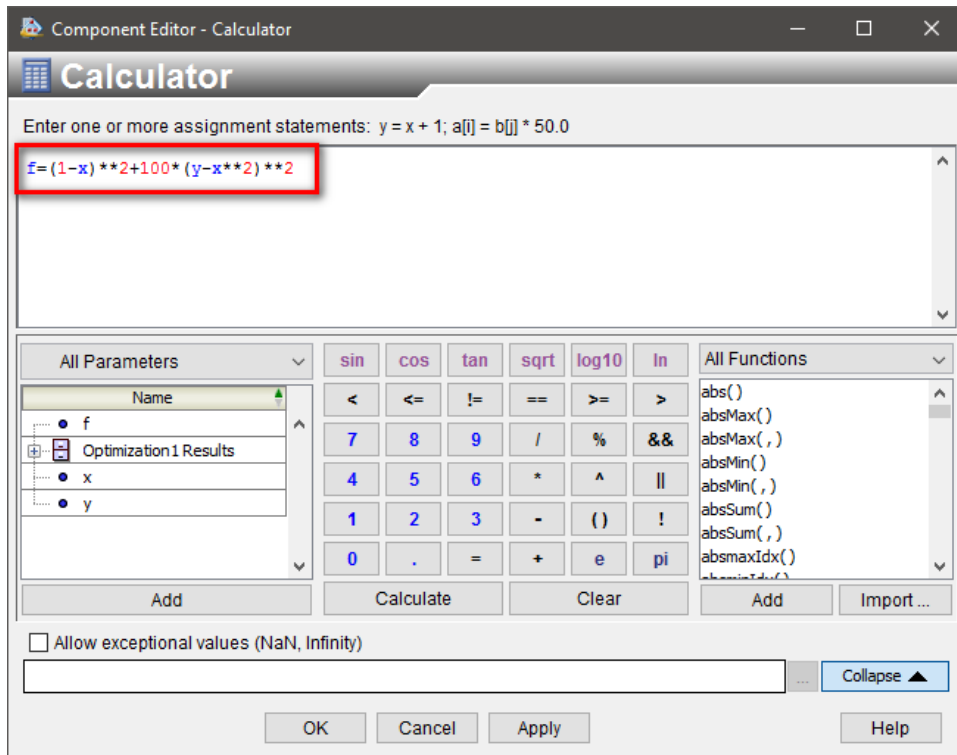
Set lower and upper bounds and initial values for the design variables x and y.



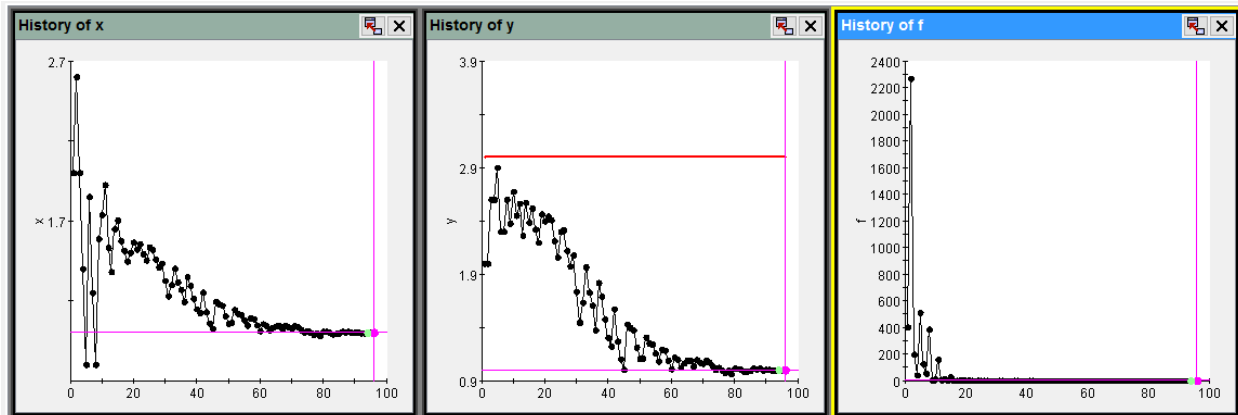
Define the problem as minimization of the objective function $f(x,y)$



In the Calculator component we define the Rosenbrock function $f=f(x,y)$



History plots of design variables x and y, and objective function f.



The result of iSight optimization

Optimization1

Optimization Results

Started on Wed Dec 20 11:14:58 PST 2017

Optimization Technique: DownhillSimplex

Failed Run Objective Value = 1.0E30

Failed Run Penalty Value = 1.0E30

Initial Simplex Size = 0.1

Max Failed Runs = 5

Max Iterations = 50

Simplex Count = 1

Starting design point:

x = 2.0 [-3.0 < x < 3.0]

y = 2.0 [-3.0 < x < 3.0]

Completed on Wed Dec 20 11:14:59 PST 2017

Total design evaluations: 96

Number of feasible designs: 96

Optimum design point:

| | |
|---------------------|-------------------------|
| Run # | = 94 |
| Objective | = 2.8681931300344363E-7 |
| Penalty | = 0.0 |
| ObjectiveAndPenalty | = 2.8681931300344363E-7 |
| x | = 1.0002341568470001 |
| y | = 1.0005165338516235 |
| f | = 2.8681931300344363E-7 |