New Version OptiY 4.4
Automatic Robust Design Technology

1. Computing Environment
2. Auto Gaussian Process
3. Auto Robust Design Optimization
4. Global Sensitivity
5. 1D-Data Analysis and Principal Component Analysis
6. Taguchi Interface
7. Enhancements for SimulationX, MS Excel, Scripting

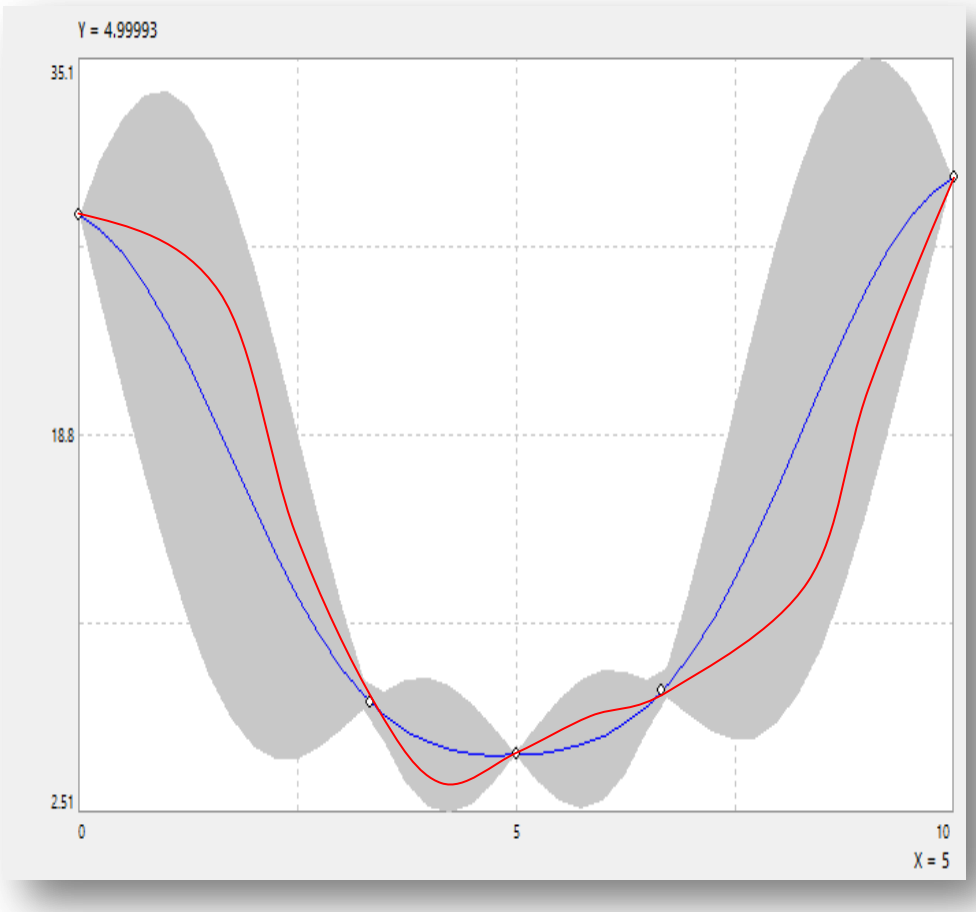
Computing Environment

1. Version 4.4 supports only 64 bit computer
2. Advantages:
   - More Memory available
   - Faster Computing

Problem for Robust Design

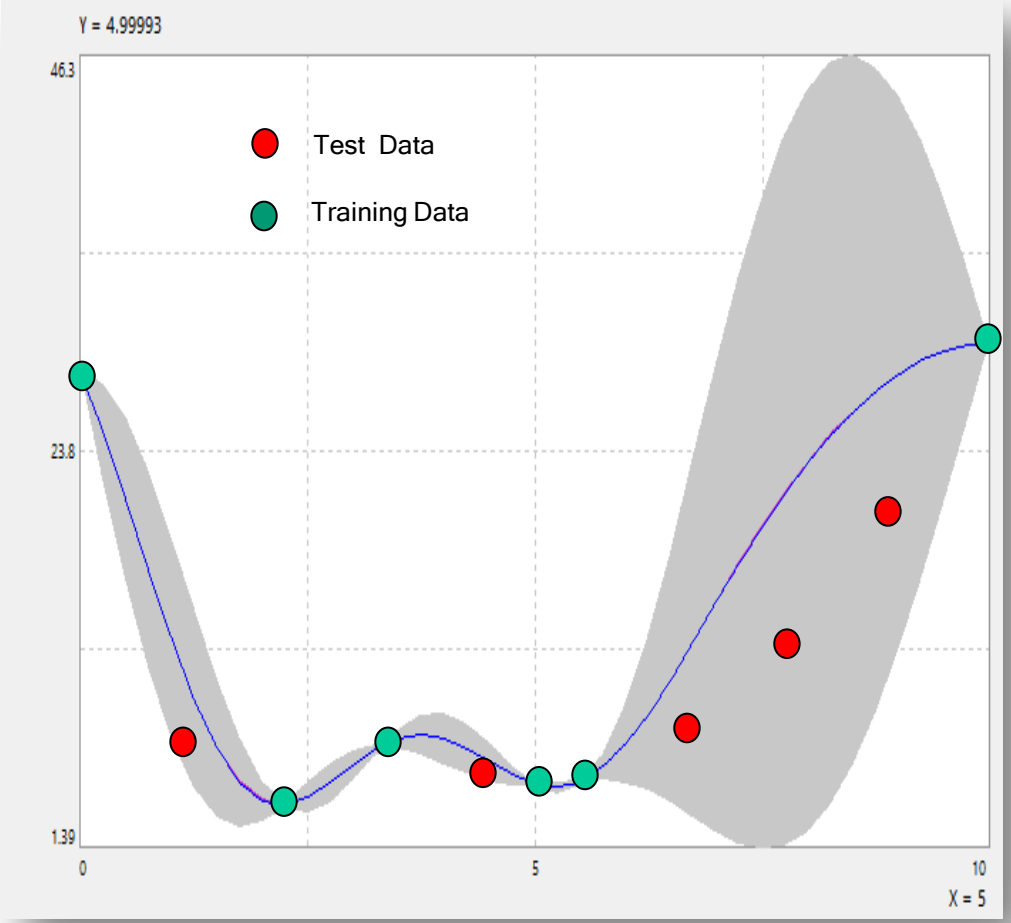
1. Limited support data available (expensive model)
2. Gaussian process with several covariance functions in subspace without support points
3. Difficult to choose a suitable meta model
4. Using residual plots, graphical presentations (2D, 3D), confidence interval

It is for non-expert a big problem



Training and Test Data

Design of Experiment	
Method	Sampling Methods
Parameter	Latin Hypercube
Sample Size	50
Random Generator	Init
Response Surface	
Adaptive Design	False
Training Data [%]	80
Default Parameters	True



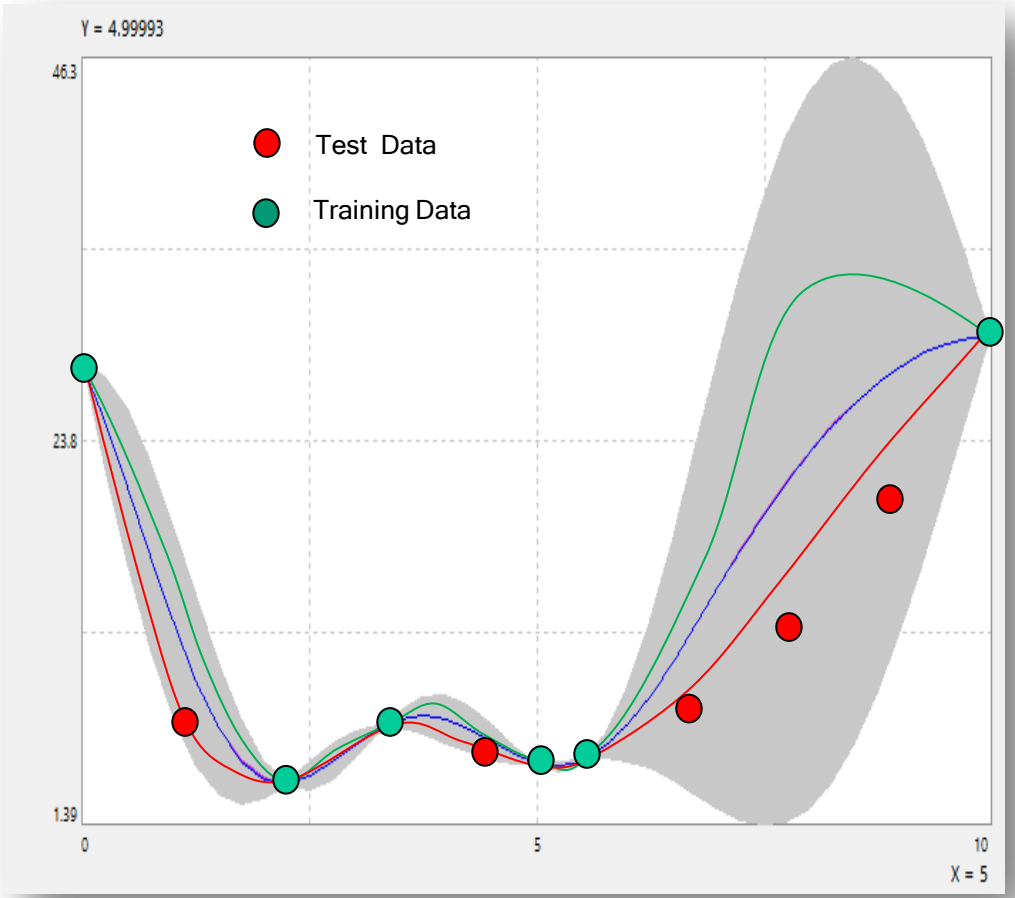
Divide design of experiment data into 2 parts:
* Training data for building the meta model
* Test Data for validation of meta model

Auto Gaussian Process

Design of Experiment	
Method	Sampling Methods
Parameter	Latin Hypercube
Sample Size	50
Random Generator	Init
Response Surface	
Adaptive Design	False
Training Data [%]	80
Default Parameters	True

Approximation	Gaussian Process
Covariance Functic	Best Covariance
Polynomial O	
Optimization	
Last Value	

- Best Covariance
- Square Exponential
- Exponential
- Gamma-Exponential
- Matérn Class 3/2
- Matérn Class 5/2
- Rational Quadratic



Automatically choosing best covariance function

Auto Robust Optimization

Constraint R

Mean + 4*Sigma < Upper Bound

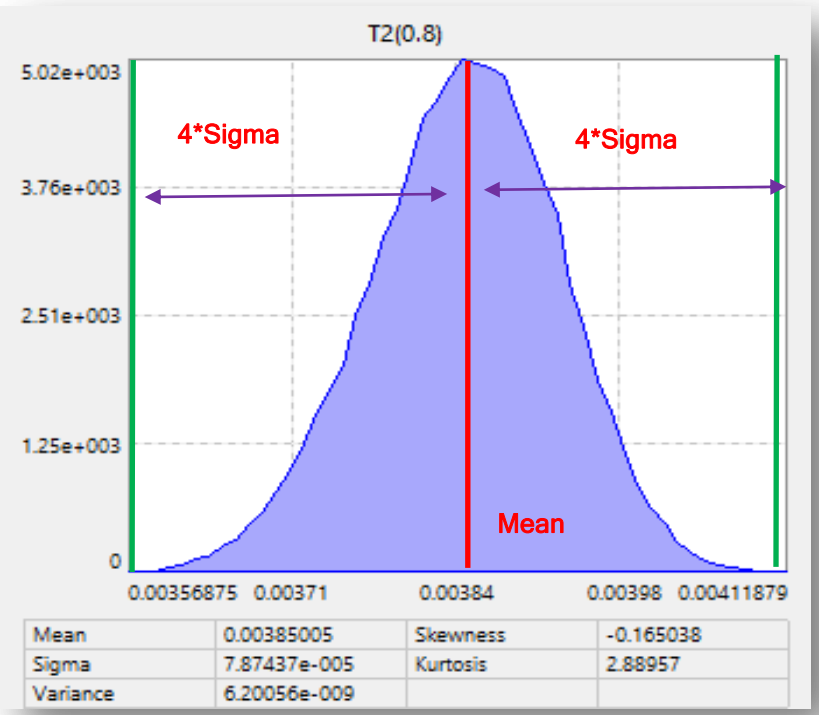
Mean – 4*Sigma > Lower Bound

Criterion C

minimize: Mean

Tolerance-Cost

minimize: w1/T1 + w2/T2 + …



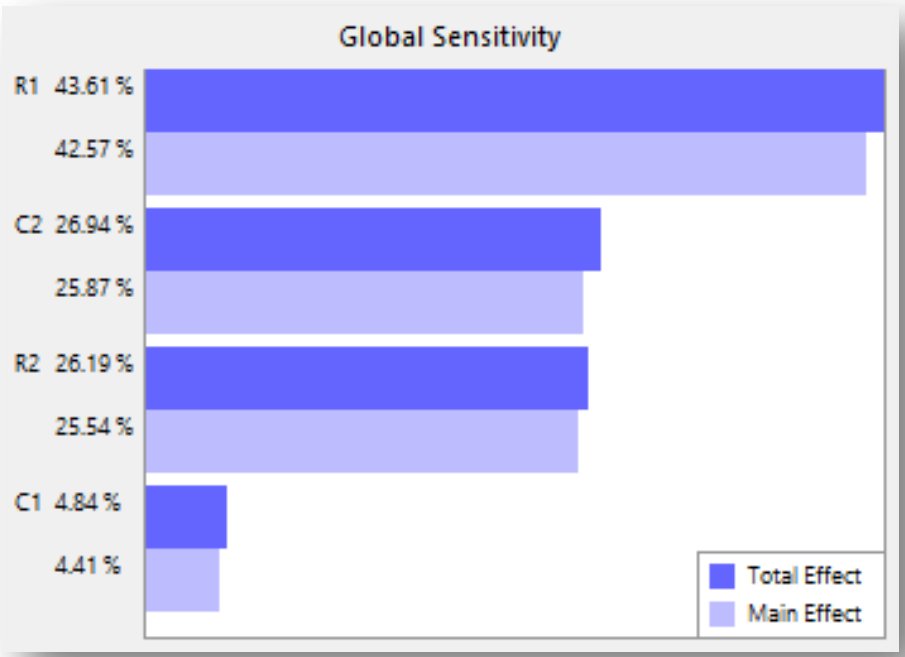
Auto Robust Design

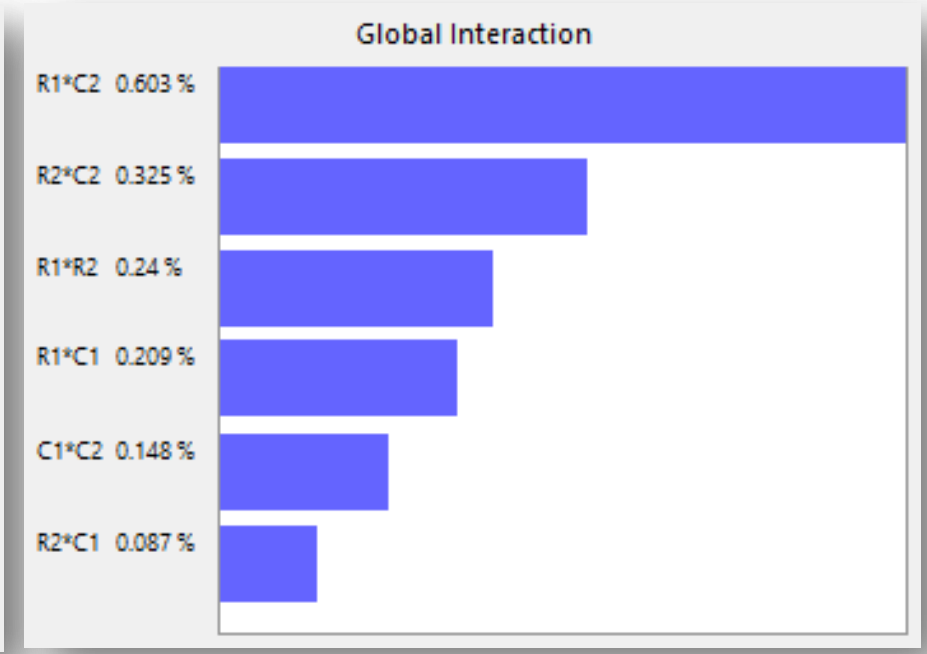
w11*R1 + w22*R2 +..+ w21*C1 +w22*C2 + .. + Cost

Global Sensitivity and Interaction

Constraints R1, R2.. and Criteria C1, C2 ..

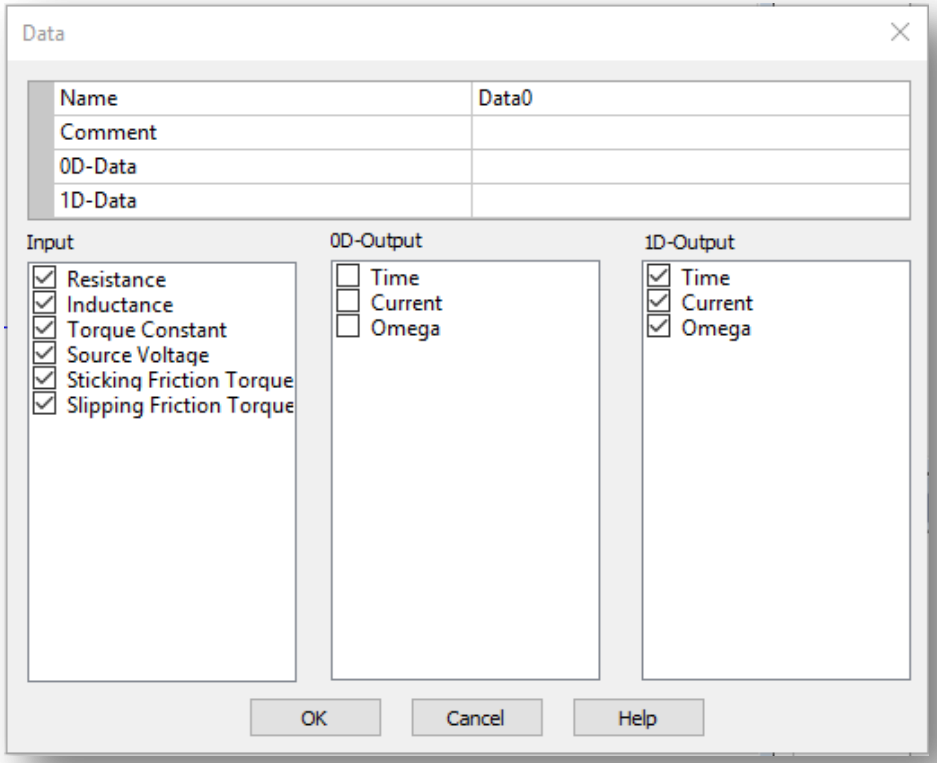
Global Function: w11*R1 + w12*R2 +..+ w21*C1 + w22*C2 + ..

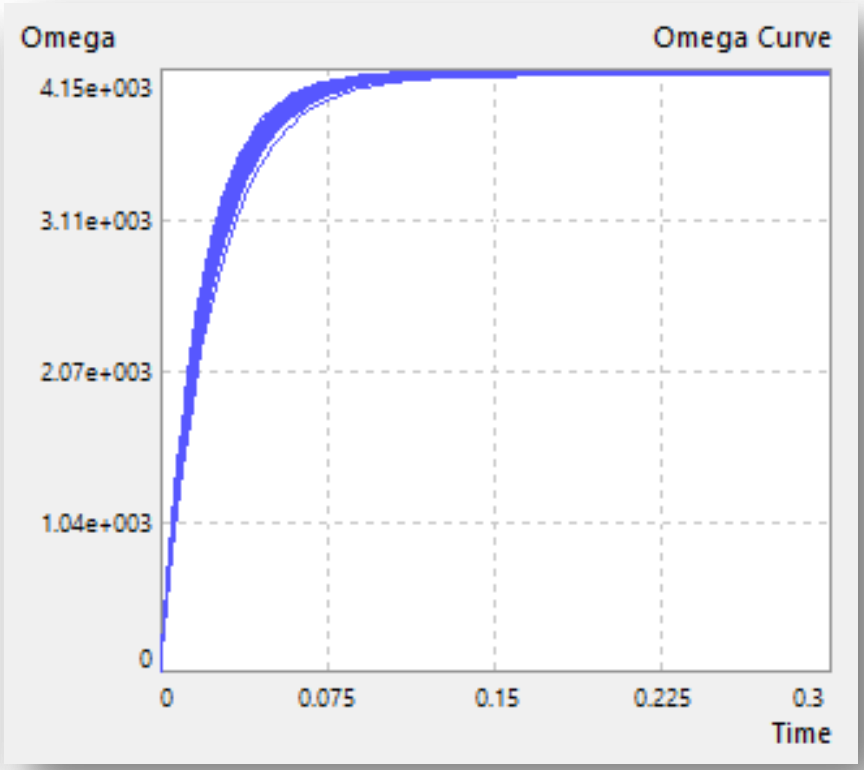




1D Data Analysis

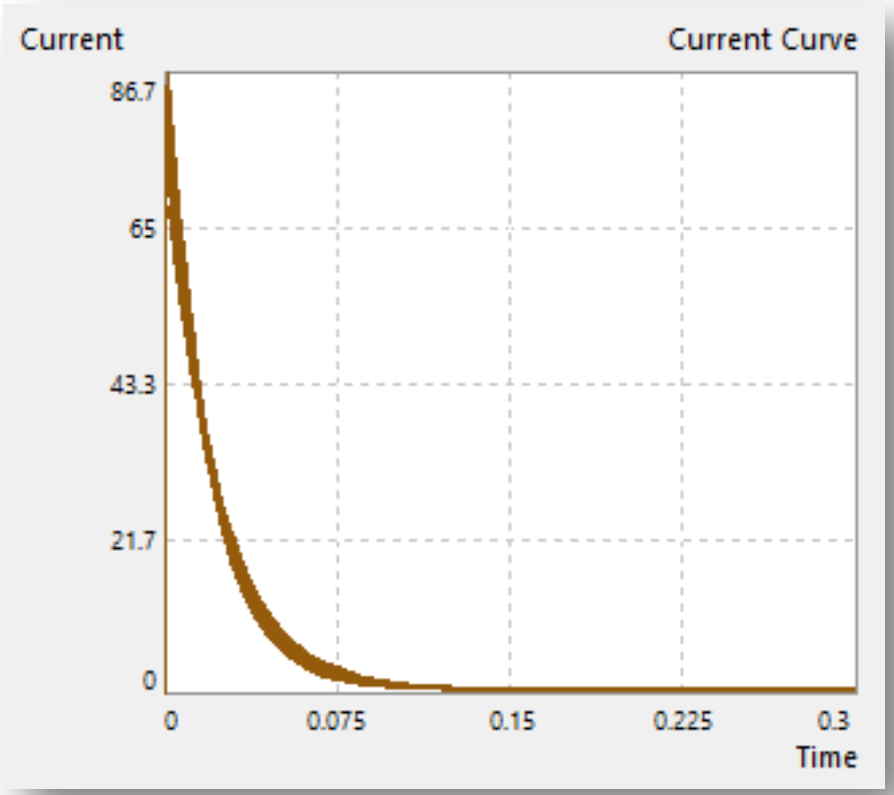
Import and analysis for 0D and 1D data

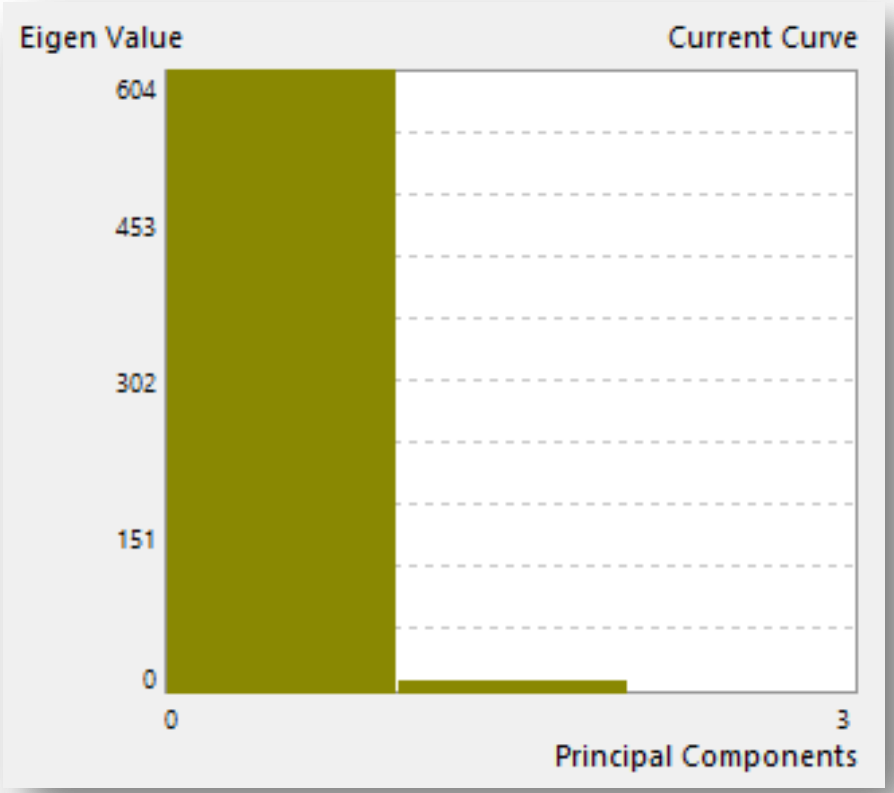




Principal Component Analysis

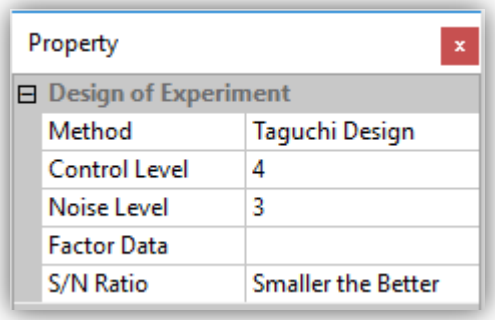
Component approximation of stochastic 1D-signal = Sensitivity of 1D-signal

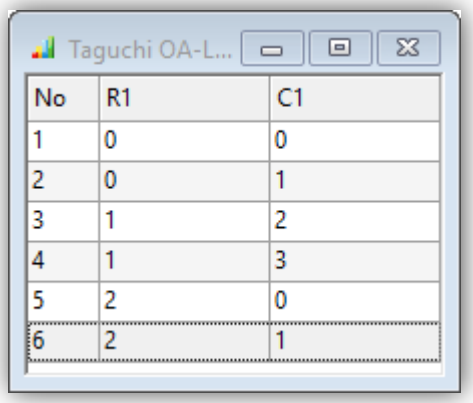


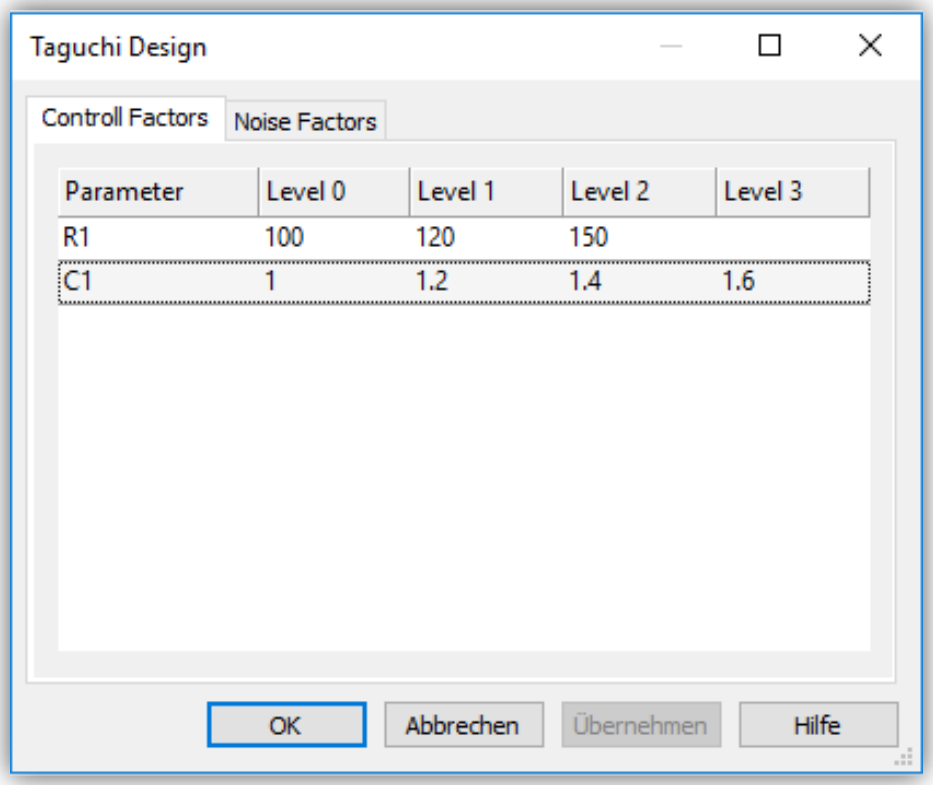


Taguchi Interface

Typical Taguchi Design: Mix-Level Orthogonal Arrays

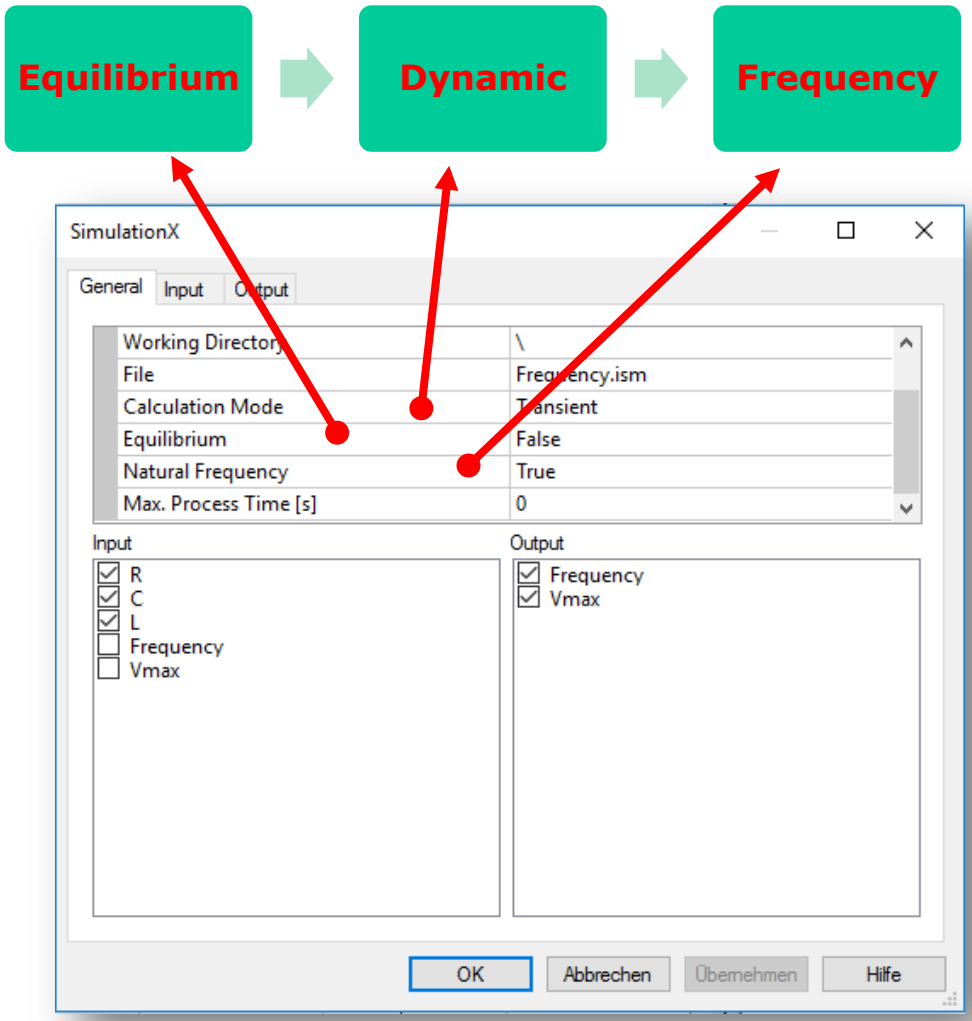






SimulationX

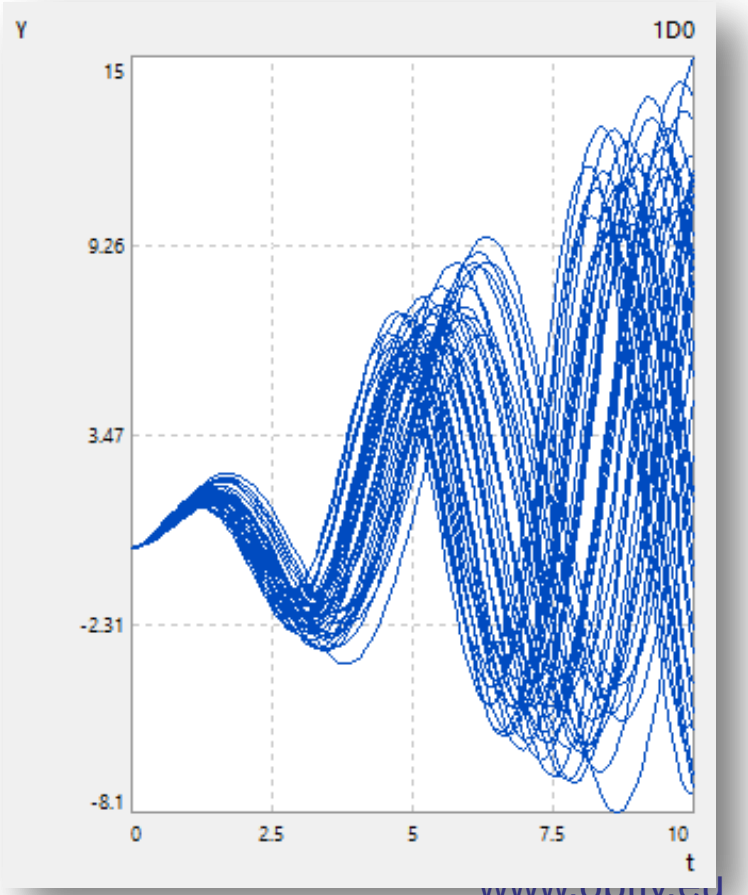
- SimulationX 3.6 and 3.7
- Equilibrium
- Dynamic Calculation
- Natural Frequency



MS Excel

- 1D Data is possible -> Curve Fitting + Probabilistic Simulation

	A	B	C	D
1	Parameter			
2	A	1,5		
3	B	0,3		
4				
5			Time	Displacement
6			0	0
7			0,1	0,04494381
8			0,2	0,11910404
9			0,3	0,22048966
10			0,4	0,34585699
11			0,5	0,49081938
12			0,6	0,64999615
13			0,7	0,81719626
14			0,8	0,98563127
15			0,9	1,14815102
16			1	1,29749499
17			1,1	1,42655153
18			1,2	1,52861716
19			1,3	1,59764763
20			1,4	1,62849311
21			1,5	1,6171098
22			1,6	1,56074109
23			1,7	1,45806232



Scripting

Script Editor is integrated in OptiY

Double-click on Script-Item in Explorer to open the Script Editor