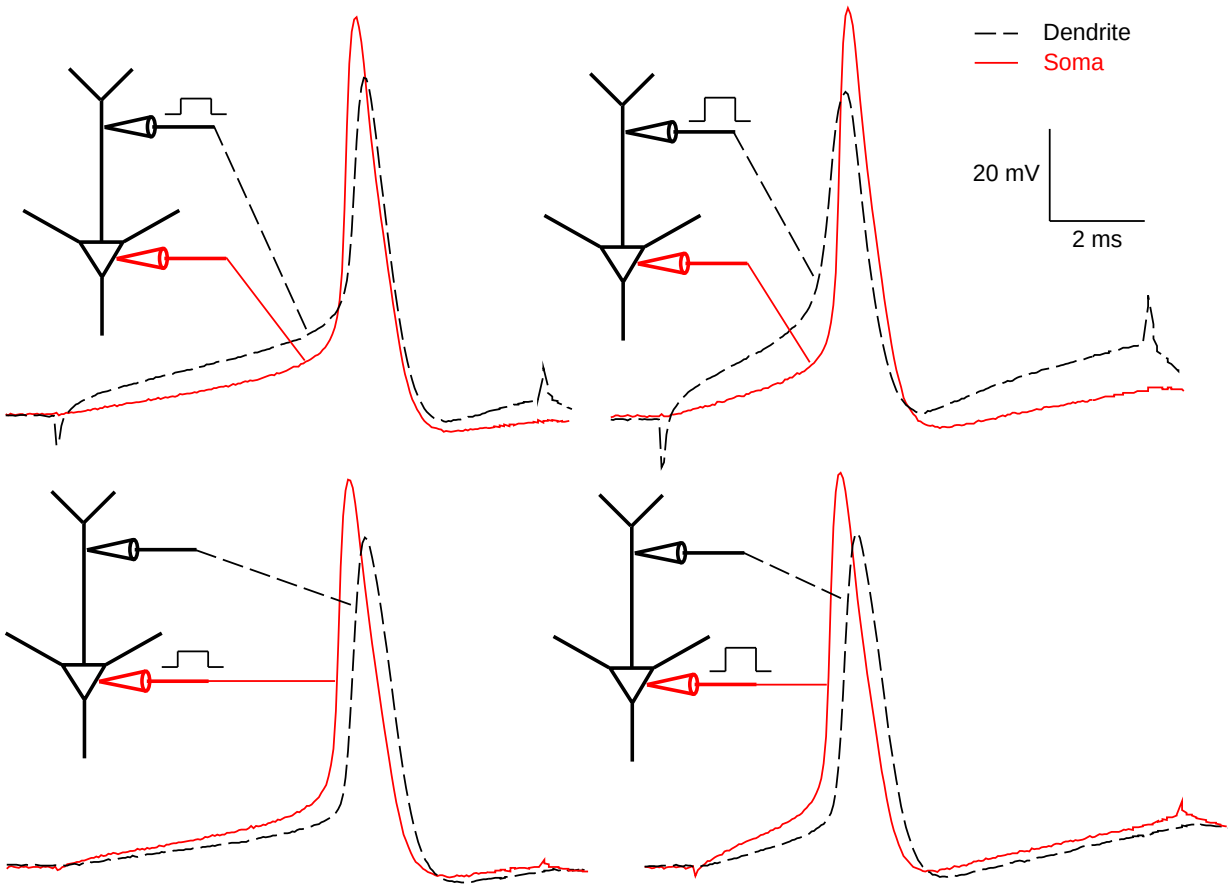
Multiple Run Fitter

Goal: Adjust model parameters to fit data from multiple experiments.



See: Shen et. al. (1999), J. Neurophysiol. 82:3006
Computational analysis of action potential initiation in mitral cell soma and dendrites based on dual patch recordings.

Optimizing over multiple experimental protocols

For each protocol:

Which model variables are to be compared to the data?

What is the data?

What is the error function?

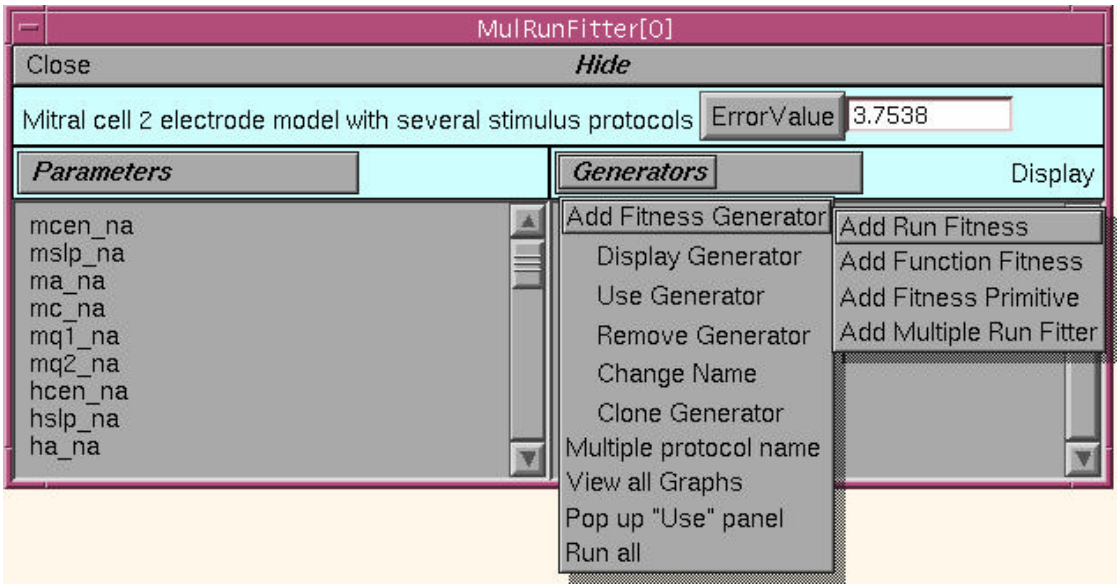
What is the stimulus protocol?

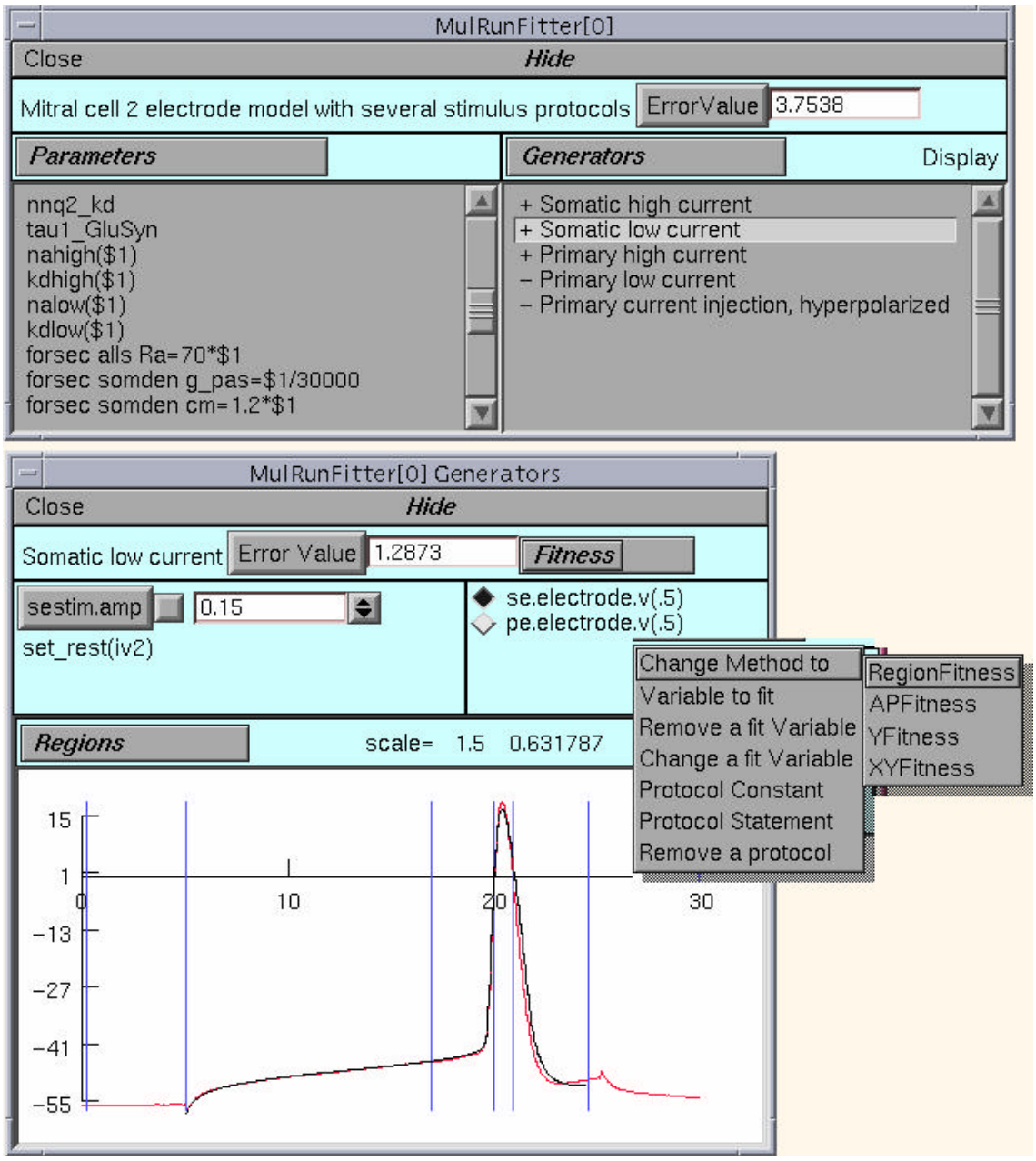
Parameters:

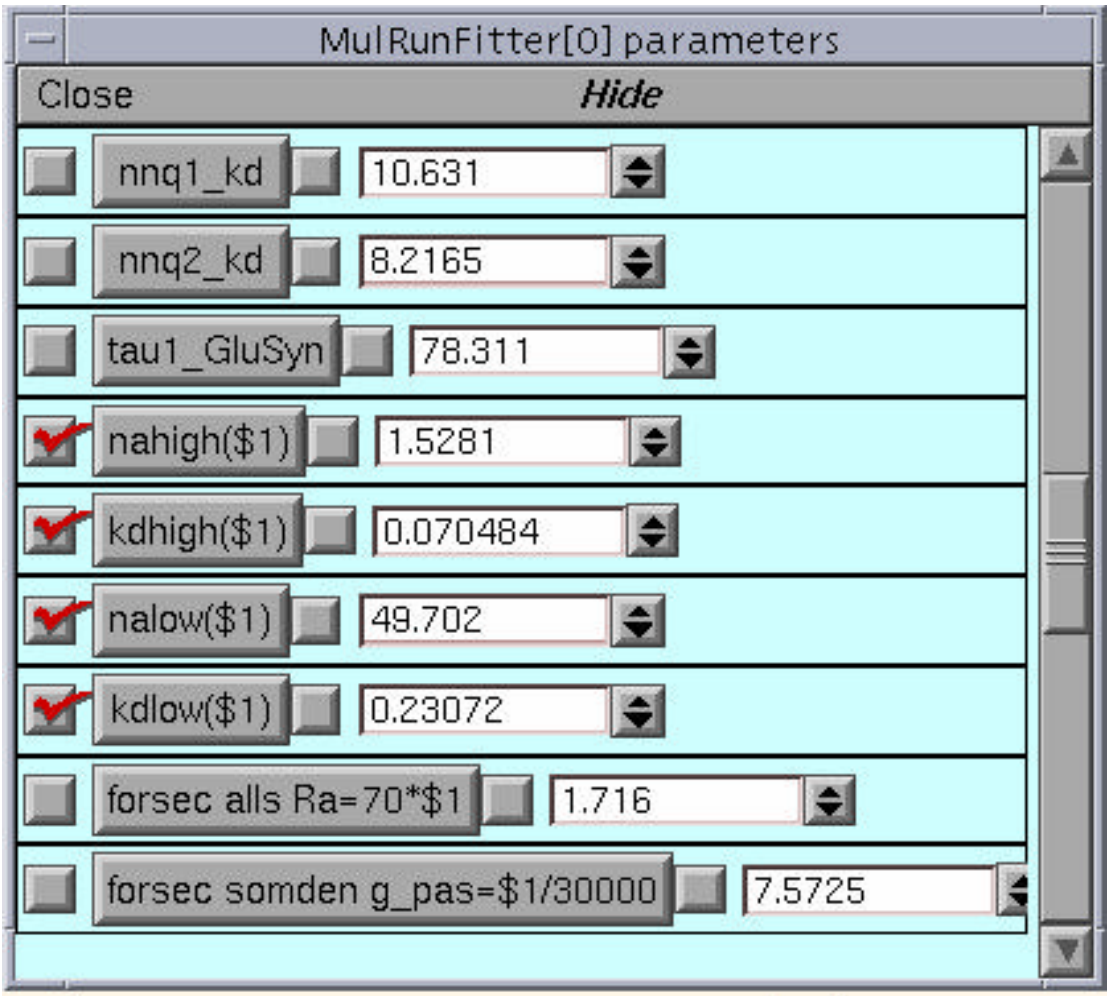
Which model parameters are you allowed to vary to obtain a fit.

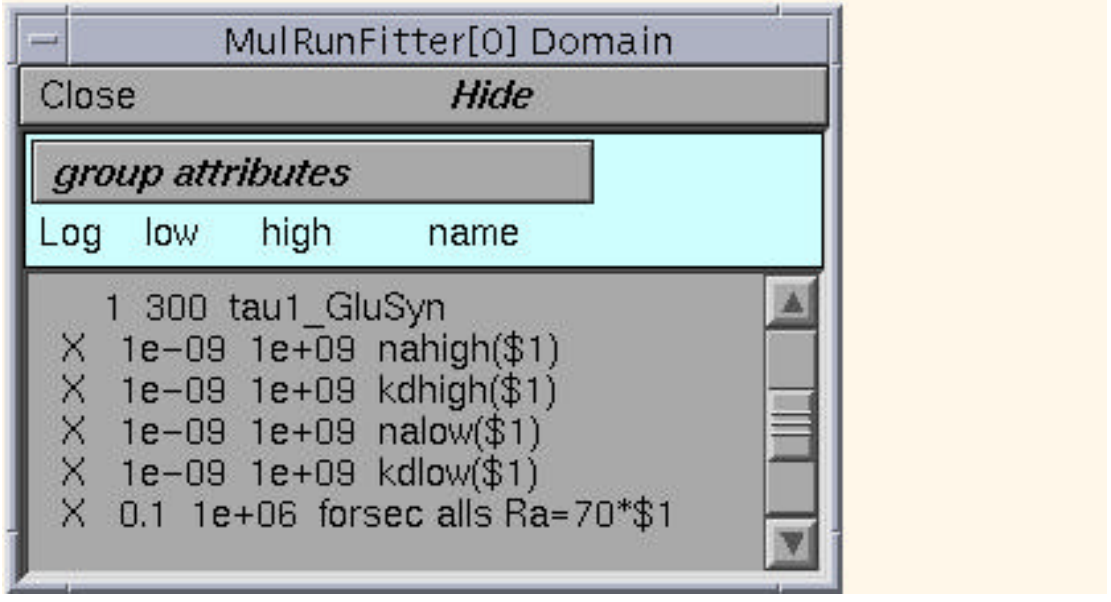
example.ses.ft1

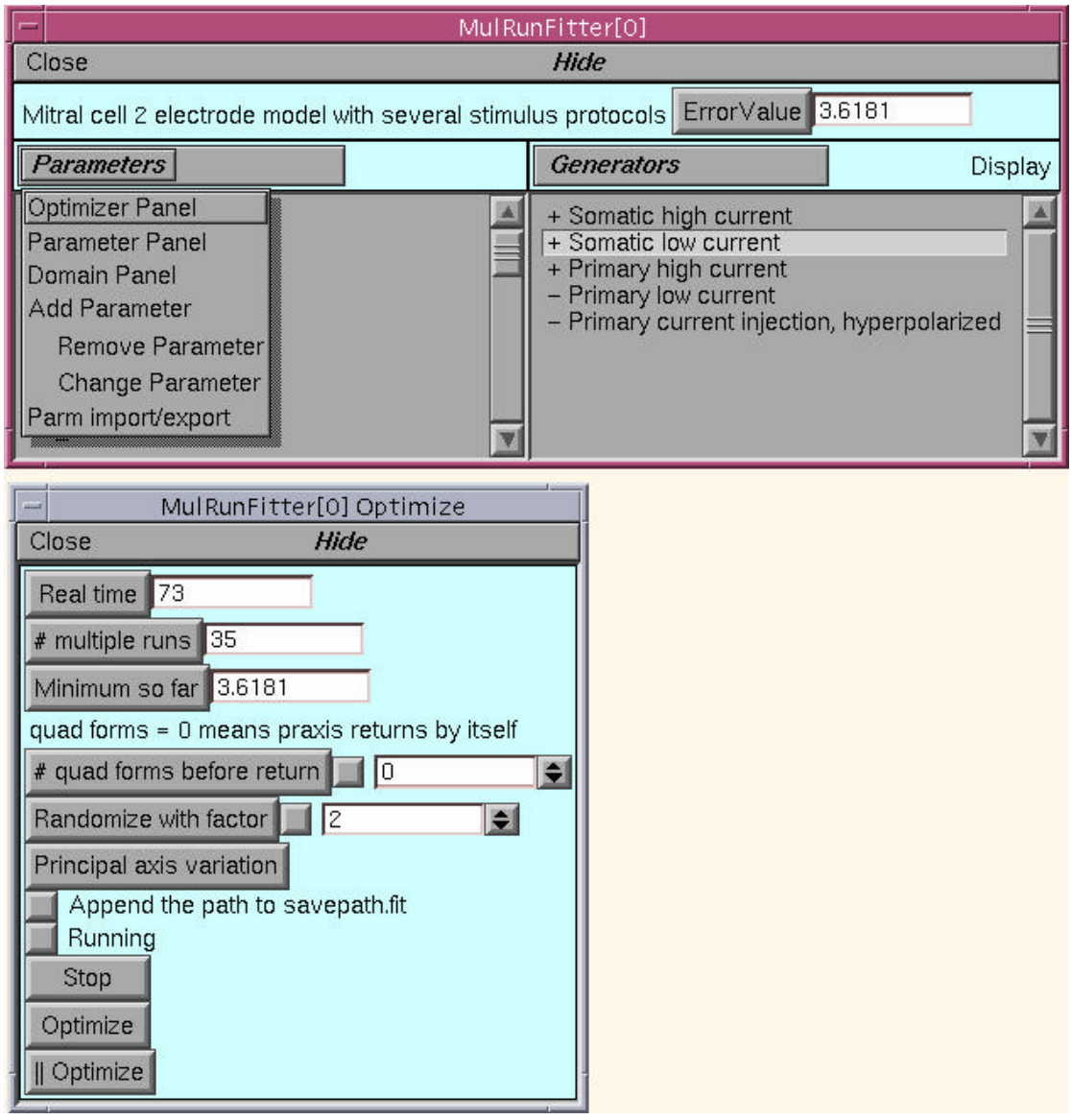
```
ParmFitness:   Mitral cell 2 electrode model
    FitnessGenerator: Somatic high current
         RunConstant:    sestim.amp 0.3 0
         RunStatement:   1, set_rest(iv1)
         RegionFitness:  se.electrode.v(.5)
         RegionFitness:  pe.electrode.v(.5)

    FitnessGenerator: Primary high current
        RunConstant:    pestim.amp 0.4 0
        RunStatement:   1, set_rest(iv3)
        RegionFitness:  se.electrode.v(.5)
        RegionFitness:  pe.electrode.v(.5)

    FitnessGenerator: Primary current, hyperpolarize soma
        RunConstant:    pestim.amp 0 0
                        sestim.amp 0 0
                        sestim.del 0 1
                        sestim.dur 0 10
        APFitness:      se.electrode.v(.5)
        APFitness:      pe.electrode.v(.5)

    Parameters:
        "mcen_na",             -31.2258, -100,    20, 0, 0
        "nahigh($1)",           1.52812, 1e-9, 1e+09, 1, 1
        "kdhigh($1)",         0.0704842, 1e-9, 1e+09, 1, 1
        "nalow($1)",            49.7024, 1e-9, 1e+09, 1, 1
        "kdlow($1)",           0.230715, 1e-9, 1e+09, 1, 1
        "forsec alls Ra=70*$1",  1.716,  0.1, 1e+06, 0, 1
        "forsec axon g_pas=$1/1000", 1, 0.01,   100, 0, 0
        "iv1",                 -57.9528,  -67,   -50, 0, 0
        "iv4",                 -58.3375,  -67,   -50, 0, 0
        "pe.electrode.Ra=$1",   11.3141,  0.5,   100, 0, 0
        "pe.electrode.cm=$1",   10.5573, 0.01,    50, 0, 0
End ParmFitness
```


MulRunFitter[0]
Close
Hide
Mitral cell 2 electrode model with several stimulus protocols
ErrorValue
3.7538
Parameters
Generators
Display
mcen_na
mslp_na
ma_na
mc_na
mq1_na
mq2_na
hcen_na
hslp_na
ha_na
Add Fitness Generator
Display Generator
Use Generator
Remove Generator
Change Name
Clone Generator
Multiple protocol name
View all Graphs
Pop up "Use" panel
Run all
Add Run Fitness
Add Function Fitness
Add Fitness Primitive
Add Multiple Run Fitter


MulRunFitter[0]
Close
Hide
Mitral cell 2 electrode model with several stimulus protocols
ErrorValue
3.7538
Parameters
Generators
Display
nnq2_kd
tau1_GluSyn
nahigh($1)
kdhigh($1)
nalow($1)
kdlow($1)
forsec alls Ra=70*$1
forsec somden g_pas=$1/30000
forsec somden cm=1.2*$1
+ Somatic high current
+ Somatic low current
+ Primary high current
– Primary low current
– Primary current injection, hyperpolarized
MulRunFitter[0] Generators
Close
Hide
Somatic low current
Error Value
1.2873
Fitness
sestim.amp
0.15
set_rest(iv2)
se.electrode.v(.5)
pe.electrode.v(.5)
Change Method to
Variable to fit
Remove a fit Variable
Change a fit Variable
Protocol Constant
Protocol Statement
Remove a protocol
RegionFitness
APFitness
YFitness
XYFitness
Regions
scale= 1.5 0.631787
15
1
-13
-27
-41
-55
0
10
20
30


MulRunFitter[0] parameters
Close
Hide
nnq1_kd
10.631
nnq2_kd
8.2165
tau1_GluSyn
78.311
nahigh($1)
1.5281
kdhigh($1)
0.070484
nalow($1)
49.702
kdlow($1)
0.23072
forsec alls Ra=70*$1
1.716
forsec somden g_pas=$1/30000
7.5725


MulRunFitter[0] Domain
Close
Hide
group attributes
Log low high name
1 300 tau1_GluSyn
X 1e-09 1e+09 nahigh($1)
X 1e-09 1e+09 kdhigh($1)
X 1e-09 1e+09 nalow($1)
X 1e-09 1e+09 kdlow($1)
X 0.1 1e+06 forsec alls Ra=70*$1


MulRunFitter[0]
Close
Hide
Mitral cell 2 electrode model with several stimulus protocols
ErrorValue
3.6181
Parameters
Generators
Display
Optimizer Panel
Parameter Panel
Domain Panel
Add Parameter
Remove Parameter
Change Parameter
Parm import/export
+ Somatic high current
+ Somatic low current
+ Primary high current
– Primary low current
– Primary current injection, hyperpolarized
MulRunFitter[0] Optimize
Close
Hide
Real time
73
multiple runs
35
Minimum so far
3.6181
quad forms = 0 means praxis returns by itself
quad forms before return
0
Randomize with factor
2
Principal axis variation
Append the path to savepath.fit
Running
Stop
Optimize
|| Optimize