Blog Entry © January 1, 2025, by James Pate Williams, Jr Solution of a 4x4 System of Nonlinear Equations Using a Homegrown Evolutionary Hill-Climber

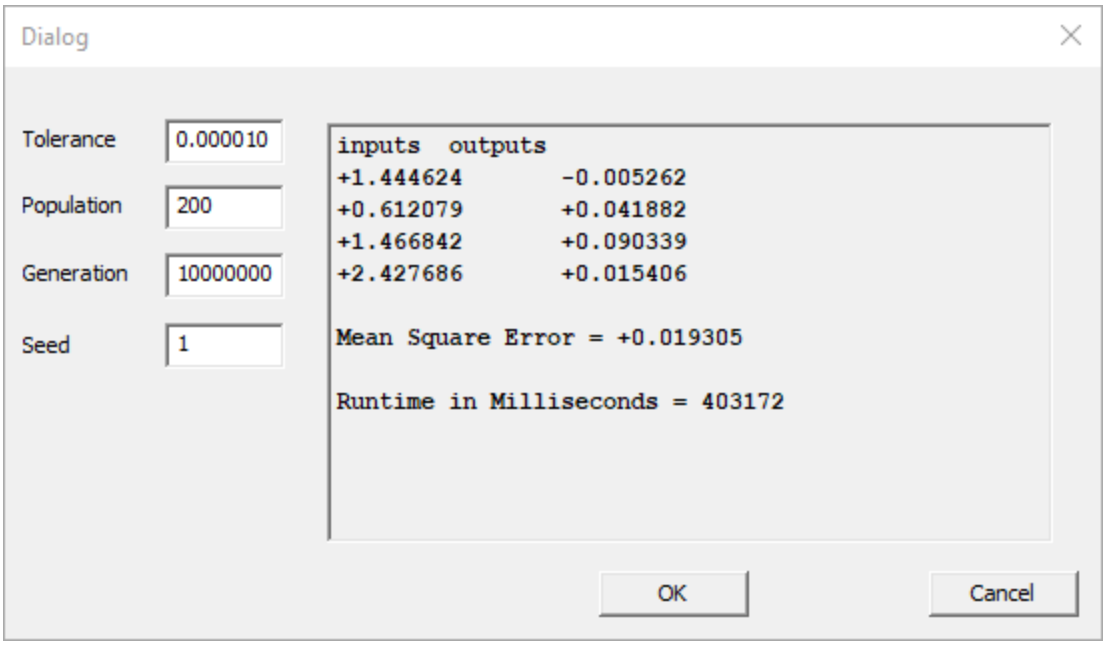
The hill-climber uses a two-member tournament selection algorithm to select a child genome to be mutated by a real-number. The method is elitist since each generation the worse candidate solution is replaced by a child. We use the least square error function.

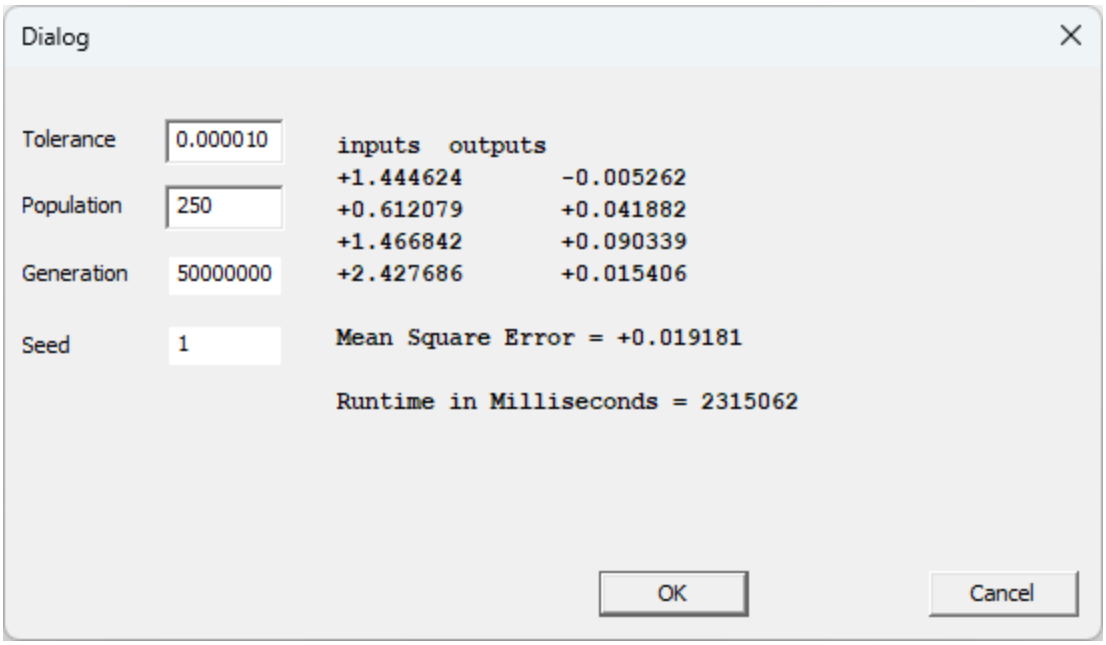
```
Q(u,x,y,z)=u*u+x*x-y-1=0
R(u,x,y,z)=exp(u)+x*x*x-z-2=0
S(u,x,y,z)=u-sin(x*y)+z-3=0
T(u,x,y,z)=u*z+x-cos(y)-4=0

inputs    outputs
+1.444624 -0.005262
+0.612079 +0.041882
+1.466842 +0.090339
+2.427686 +0.015406

Mean Square Error = +0.019305

Runtime in Milliseconds = 403172
```




Dialog
Tolerance
0.000010
Population
250
Generation
50000000
Seed
1
inputs outputs
+1.444624 -0.005262
+0.612079 +0.041882
+1.466842 +0.090339
+2.427686 +0.015406
Mean Square Error = +0.019181
Runtime in Milliseconds = 2315062
OK
Cancel