Subject: Amoeba function
Posted by Nicki on Thu, 19 Nov 2009 01:18:51 GMT
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I have the following problem with my amoeba code: It does not do its job ;) (Probably because i didn't write it right). It's supposed to find the minimum. But it only finds a local minimum (I guess) not a global one.

This is the code:

```
FUNCTION CONSTRAINT,Pin
COMMON FUNC_XY, P0, dP
return,P0+2*dP/!pi*atan(Pin)
END
FUNCTION FUNC, Pin, NOCONSTR=NOCONSTR
if keyword_set(NOCONSTR) then P=Pin $
else P=CONSTRAINT(Pin)
nrows=1.       ;number of rows
mu=438.689       ;attenuation coefficient
r_tot=1.5       ;target resolution
r_i=P[3]       ;detector intrinsic resolution
rad=P[0]        ;distance 'centre of source'-pinhole
wdet=P[1]       ;detector width
dfov=P[2]       ;diameter of the field-of-view
a=180/!pi*2*asin(dfov/2/rad)     ;pinhole opening angle
f=wdet/2/(tan(a/2/180*!pi))     ;distance pinhole-detector
N=2.*!pi*(rad+f)/(1.1*wdet)*Nrows     ;number of pinholes/detectors
 d=sqrt(R_tot^2-(rad/f)^2*(R_i)^2)/((rad/f)+1.)-alog(2)/mu*ta n(a/2*!pi/
180)  ;pinhole diameter
 deffs=sqrt(d^2+2/mu*d*tan(a/2*!pi/180)+2/(mu^2)*(tan(a/2/180 *!pi))
^2) ;effective diameter (Sensitivity)
S=N*deffs^2/16/(rad^2)*100     ;Sensitivity
if ~finite(s) then stop
RETURN, -S
END

pro numerical
COMMON FUNC_XY, P0, dP
P0=[60., 80., 80., 0.45]      ;initial starting point
dP=[27., 20., 20., 0.4]       ;scale
R=AMOEBA(1.0e-5,SCALE=dP, P0=P0, FUNCTION_VALUE=fval)   ;result
if r[0] eq -1 then begin
       print,'No minimum found.'
       return
endif
xmax=CONSTRAINT(r)
ymax=-fval[0]
```

END

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It gives me a minimum (or in this case actually maximum, but anyway...) for R_i=0.05 and w_det=100. S_max is then 0.0088 or s.th like that. However, if i remove R_i and w_det from the constraint and put them into the input, as R_i=0.05 and w_det=100,

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.............
r_i=0.05       ;detector intrinsic resolution
rad=P[0]       ;distance 'centre of source'-pinhole
wdet=100.      ;detector width
dfov=P[1]      ;diameter of the field-of-view
a=180/!pi*2*asin(dfov/2/rad)     ;pinhole opening angle
f=wdet/2/(tan(a/2/180*!pi))     ;distance pinhole-detector
N=2.*!pi*(rad+f)/(1.1*wdet)*Nrows     ;number of pinholes/detectors
 d=sqrt(R_tot^2-(rad/f)^2*(R_i)^2)/((rad/f)+1.)-alog(2)/mu*ta n(a/2*!pi/
180)  ;pinhole diameter
 deffs=sqrt(d^2+2/mu*d*tan(a/2*!pi/180)+2/(mu^2)*(tan(a/2/180 *!pi))
^2) ;effective diameter (Sensitivity)
S=N*deffs^2/16/(rad^2)*100     ;Sensitivity
if ~finite(s) then stop
RETURN, -S
END
pro numerical
COMMON FUNC_XY, P0, dP
P0=[60., 80.]      ;initial starting point
dP=[27., 20.]
.....................
```

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i get a much higher S_max of 0.012, which is pretty weird. Does anybody get what i mean and can maybe help me out???

Subject: Re: Amoeba function
Posted by b_gom on Thu, 19 Nov 2009 23:25:19 GMT

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I suspect most readers will not have the time to go through your code and optimize it for you :), in fact I gave up trying to do a quick read through to find out what the form of the equation is you are trying to minimize. I can give you some of my experience with Amoeba, however. Amoeba cannot and does not guarantee that it will find the global minimum. The amoeba that the function is named after crawls its way down the slope of your minimization function until it finds a hollow to settle in. The depth of this hollow is related to the characteristic length scale that you tell Amoeba to use, and the starting guess for the parameters. In practice, you ultimately bear the responsibility of judging whether Amoeba has found the best of all

possible minima.

Amoeba is a fast and useful routine for minimizing ugly complicated data sets or functions that do not have analytical derivatives. If you have a simple equation that you are trying to fit to a data set (even if it doesn't have analytical derivatives), you might find other fitting routines like MPFIT\MPFITFUN more predictable.
