

```
→ kill(all)$ load(distrib)$ ratprint:false$ solveexplicit:true$ fpprintprec:5$
load("fit.mac")$ display2d:true$
```

```
→ speed: [40,70,150,230,310,370,420,460,490,530]$ length(speed);
(%o8) 10
```

```
→ /* 1:u5 2:P34 3:dkw 4:etas 5:bsr 6:cp 7:cv 8:gamma 9:D5 10:VS */
data: read_matrix("map.csv")$ /* must have commas!!! */
trpdata1: transpose(data)[1]$
trpdata5: transpose(data)[5]$
trpdata4: transpose(data)[4]$
trpdata1[50]; length(trpdata1);
```

```
(%o13) 70.0
```

```
(%o14) 185
```

```
→ speedsort: makelist( [],j,1,length(speed),1 )$
for j:1 thru length(speed) do
  for i:1 thru length(trpdata1) do
    if round(trpdata1[i])=speed[j] then
      speedsort[j]: endcons([trpdata5[i],trpdata4[i]],speedsort[j]);
speedsort[1]$
```

```
(%o16) done
```

```
→ dataplot: makelist( [],i,1,length(speed),1 )$
for j:1 thru length(speed) do (
  data5[j]: makelist( speedsort[j][i][1],i,1,length(speedsort[j]),1 ),
  data4[j]: makelist( speedsort[j][i][2],i,1,length(speedsort[j]),1 ),
  dataL[j]: makelist( [ data5[j][i] ,data4[j][i] ],i,1,length(data5[j]),1 ),
  dataplot[j]: endcons([ discrete,data5[j],data4[j] ], dataplot[j])
);
```

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```
(%o19) done
```

```
→ pd: []$ for j:1 thru length(speed) do pd: endcons(dataplot[j][1],pd)$ pd$
```

```
→ plot2d( pd, [x, 0, 1],
  [style,lines], [color,cyan,blue,red,green,magenta,black])$
/* [style,points], [point_type,diamond], [color,[color,cyan,blue,red,green,magenta,b
```

```
→ /* fit global: sinus */;
```

```
→ data5flat: []$
for j:1 thru length(speed) do
  for i:1 thru length(data5[j]) do
    data5flat: endcons(data5[j][i],data5flat)$
  data4flat: []$
  for j:1 thru length(speed) do
    for i:1 thru length(data4[j]) do
      data4flat: endcons(data4[j][i],data4flat)$
    dataLflat: makelist( [ data5flat[i] ,data4flat[i] ],i,1,length(trpdata1),1 )$
    dataplotflat: [ discrete, data5flat,data4flat ]$
```

→

```

dataM: apply ('matrix, dataLflat)$
fn: a·sin(m·x)$
sigL: makelist (1,i,1,length(dataLflat))$
/·sigL: [1,1,1,1,1,1e-5,1,1,1,1,1,1,1,1];·/
nlf: nlf (dataM,sigL,fn,[a,m],[0.8,2.5])$
fit: ev(fn, nlf[1])$
p: []$ p: endcons(dataplotflat,p)$ p: endcons(fit,p)$
wxplot2d( p, [x, 0, 1], [style,points,[lines,10,0]], [point_type,diamond], [color,blue,n

```

Ndata = 185

Nparam = 2

dof = 183

ivar = x

ARRSTORE: use_fast_arrays=false; allocate a new property hash table for

start: params: [a=0.8,m=2.5] chi2 = 1.55588

```

n lam
1 0.001
    p_oldL = [0.8,2.5]
    p_newL = [0.70735,2.46851] chi2_new =
0.387121
    -4
2 1.0 10
    p_oldL = [0.70735,2.46851]
    p_newL = [0.707425,2.46393] chi2_new =
0.386993

```

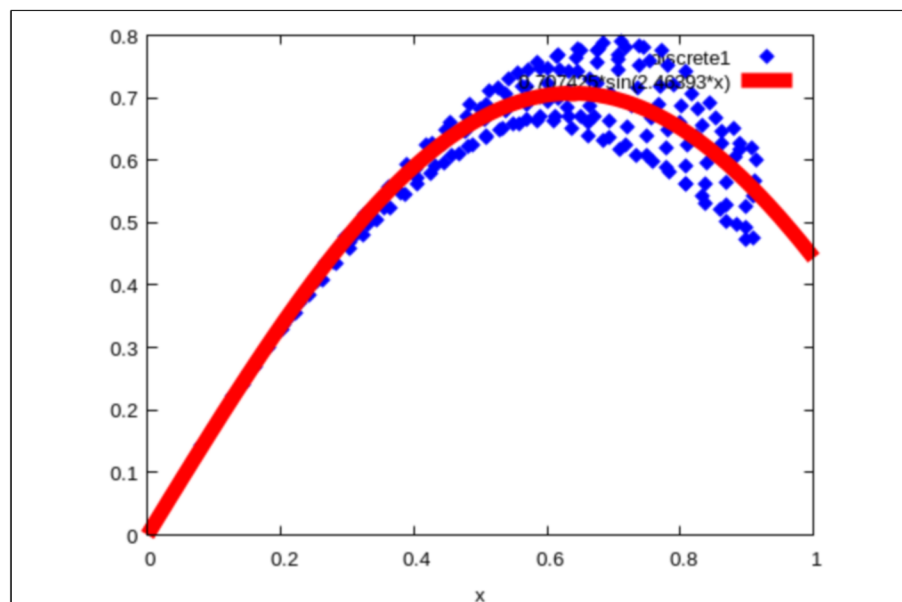
chi2/dof = 0.00211471

chi2_prob = 100.0 %

a = 0.707425 +/- 0.0861823

m = 2.46393 +/- 0.423519

(%t38)



→ `/· fit individual: sinus? ·/;`

```
→ fit: makelist( [],i,1,length(speed),1 )$
for j:1 thru length(speed) do (
  dataM: apply ('matrix, dataL[j]),
  fn: a·sin(m·x),
  sigL: makelist (1,i,1,length(dataL[j])),
  /·sigL: [1,1,1,1,1,1e-5,1,1,1,1,1,1,1];·/
  nlf: nlf (dataM,sigL,fn,[a,m],[0.8,2.5]),
  fit[j]: ev(fn, nlf[1])
);
```

```
Ndata = 31
Nparam = 2
dof = 29
ivar = x
```

ARRSTORE: use_fast_arrays=false; allocate a new property hash table for

```
start: params: [a=0.8,m=2.5] chi2 = 0.311948
```

```
-----
n lam
1 0.001
    p_oldL = [0.8,2.5]
    p_newL = [0.670872,2.4832] chi2_new =
        -4
6.25049 10
    -4
2 1.0 10
    p_oldL = [0.670872,2.4832]
    p_newL = [0.670596,2.48154] chi2_new =
        -4
6.20804 10
-----
```

```
chi2/dof = 2.1407 10-5
chi2_prob = 100.0 %
-----
```

```
a = 0.670596 +/- 0.387934
m = 2.48154 +/- 2.70615
Ndata = 33
Nparam = 2
dof = 31
ivar = x
```

ARRSTORE: use_fast_arrays=false; allocate a new property hash table for

```
start: params: [a=0.8,m=2.5] chi2 = 0.483089
```

```
-----
n lam
1 0.001
    p_oldL = [0.8,2.5]
    p_newL = [0.655809,2.5879] chi2_new =
0.00156687
    -4
2 1.0 10
-----
```

→

```
p: []$
for j:1 thru length(speed) do (
  p: endcons(dataplot[j][1],p),
  p: endcons(fit[j],p))$
```

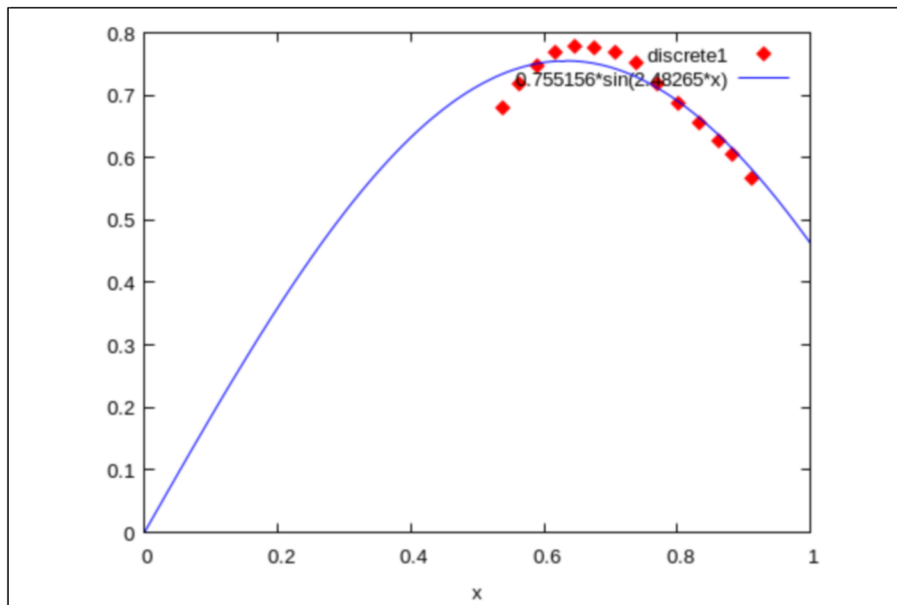
→

```
plot2d( p, [x, 0, 1], [color,cyan,cyan,blue,blue,red,red,green,green,magenta,magenta],
  /· [style,points], [point_type,diamond], [color,cyan,blue,red,green,magenta,black] ·/
```

→

```
wxplot2d( [dataplot[7][1],fit[7]], [x, 0, 1],[style,points,lines], [point_type,diamond], [color,cyan,blue,red,green,magenta,black])
```

(%t44)



→

```
fn: a·sin(m·x)$
lsq: lsquares_estimates (
  dataM, [x,y], y = fn, [a,m], initial=[0.8,2.5], iprint=[-1,0] )$
fit: fn,lsq[1];
wxplot2d( [dataplot[7][1],fit], [x, 0, 1],[style,points,lines], [point_type,diamond], [color,cyan,blue,red,green,magenta,black])
```

(fit) $0.770953 \sin(2.39132 x)$

(%t48)

