D.2 PANELV2 User's Manual

This manual describes the input for program PANELV2, an extended version of program PANEL from Moran.

This program allows input of arbitrary airfoils for analysis, modification of airfoil shapes using "bumps," and output of a file for plotting or other analysis. The program runs interactively. The input file for arbitrary airfoils is given below. (the disk with the program includes sample files, identified by ending in ".pan")

INPUT DESCRIPTION (all numeric input is in 2F10.5 format)

Card	Field	Variable	Description
1	1	Title	Up to 80 characters describing the data set/case (A79)
2	1	FNUP	number of X,Y pairs describing upper surface
	2	FNLOW	" " " lower "
3	dummy card (used for descriptor in input data)		
4	1	X	the upper surface airfoil x/c input station
	2	Y	the y/c value of the upper surface at this x/c
	********** CARD 4 is repeated FNUP times **********		
5	dummy card (used for descriptor in input data)		
6	1	X	the lower surface airfoil x/c input station
	2	Y	the y/c value of the lower surface at this x/c
	********** CARD 6 is repeated FNLOW times **********		

Notes:

1. Airfoils are input from leading edge to trailing edge.
2. The leading edge point must be input twice: once for the upper surface and once for the lower surface descriptions.

OUTPUT FILE FORMAT

Card
1. TITLE
2. Heading for output
3. 4 fields: 4F10.4, this card contains
   - i) angle of attack, in degrees
   - ii) lift coefficient
   - iii) moment coeficient (about the quarter chord)
   - iv) drag coefficient from surface pressure integration (should be zero)
4. Number of points in
5. Heading for output
6. 4 fields: 4F20.7 Note: this card is repeated for each control point
   - i) x/c, airfoil ordinate
   - ii) y/c, airfoil ordinate
   - iii) Cp, pressure coefficient
   - iii) Ue/Uinf, the surface velocity at x/c, y/c

A sample input file illustrating the format:

```
GAW1 - THEORETICAL ORDINATES
   38.      38.
  X         Y    (UPPER SURFACE)
 0.0       0.0
 0.00200   0.01300
 0.00500   0.02035
 0.01250   0.03069
 0.02500   0.04165
 0.03750   0.04974
 0.05000   0.05600
 0.07500   0.06561
 0.10000   0.07309
 0.12500   0.07909
 0.15000   0.08413
 0.17500   0.08848
 0.20000   0.09209
 0.25000   0.09778
 0.30000   0.10169
 0.35000   0.10409
 0.40000   0.10500
 0.45000   0.10456
 0.50000   0.10269
 0.55000   0.09917
 0.57500   0.09674
 0.60000   0.09374
 0.62500   0.09013
 0.65000   0.08604
 0.67500   0.08144
 0.70000   0.07639
 0.72500   0.07096
 0.75000   0.06517
 0.77500   0.05913
 0.80000   0.05291
 0.82500   0.04644
 0.85000   0.03983
 0.87500   0.03313
 0.90000   0.02639
 0.92500   0.01965
 0.95000   0.01287
 0.97500   0.00604
 1.00000  -0.00074
 LOWER SURFACE
 0.0       0.0
 0.00200  -0.00974
 0.00500  -0.01444
 0.01250  -0.02052
 0.02500  -0.02691
 0.03750  -0.03191
 0.05000  -0.03569
 0.07500  -0.04209
 0.10000  -0.04700
 0.12500  -0.05087
 0.15000  -0.05426
 0.17500  -0.05700
 0.20000  -0.05926
 0.25000  -0.06265
 0.30000  -0.06448
 0.35000  -0.06517
 0.40000  -0.06483
 0.45000  -0.06344
 0.50000  -0.06091
 0.55000  -0.05683
```

```
0.57500  -0.05396
0.60000  -0.05061
0.62500  -0.04678
0.65000  -0.04265
0.67500  -0.03830
0.70000  -0.03383
0.72500  -0.02930
0.75000  -0.02461
0.77500  -0.02030
0.80000  -0.01587
0.82500  -0.01191
0.85000  -0.00852
0.87500  -0.00565
0.90000  -0.00352
0.92500  -0.00248
0.95000  -0.00257
0.97500  -0.00396
1.00000  -0.00783
```

A sample output from PANELv2:

```
    PROGRAM PANELv2
    Revised version of Moran code
    modifications by W.H. Mason

    INPUT NLOWER,NUPPER
    (nupper and nlower MUST be equal, and nupper + nlower MUST be less than 100)
40,40

 for internally generated ordinates,    enter 0
 to read an external file of ordinates, enter 1
1

 Enter name of file to be read: gaw1.pan

 Input file name:gaw1.pan
File title:: GAW1 - THEORETICAL ORDINATES


  NU =  38     NL =  38

   Upper surface ordinates

     index         X/C          Y/C
      38        0.000000      0.000000
      39        0.002000      0.013000
      40        0.005000      0.020350
      41        0.012500      0.030690
      42        0.025000      0.041650
      43        0.037500      0.049740
      44        0.050000      0.056000
      45        0.075000      0.065610
      46        0.100000      0.073090
      47        0.125000      0.079090
      48        0.150000      0.084130
      49        0.175000      0.088480
      50        0.200000      0.092090
      51        0.250000      0.097780
      52        0.300000      0.101690
      53        0.350000      0.104090
      54        0.400000      0.105000
      55        0.450000      0.104560
      56        0.500000      0.102690
      57        0.550000      0.099170
      58        0.575000      0.096740
      59        0.600000      0.093740
      60        0.625000      0.090130
      61        0.650000      0.086040
      62        0.675000      0.081440
      63        0.700000      0.076390
      64        0.725000      0.070960
      65        0.750000      0.065170
      66        0.775000      0.059130
      67        0.800000      0.052910
      68        0.825000      0.046440
      69        0.850000      0.039830
      70        0.875000      0.033130
      71        0.900000      0.026390
      72        0.925000      0.019650
      73        0.950000      0.012870
      74        0.975000      0.006040
      75        1.000000     -0.000740
```

Lower surface ordinates

index	X/C	Y/C
38	0.000000	0.000000
37	0.002000	-0.009740
36	0.005000	-0.014440
35	0.012500	-0.020520
34	0.025000	-0.026910
33	0.037500	-0.031910
32	0.050000	-0.035690
31	0.075000	-0.042090
30	0.100000	-0.047000
29	0.125000	-0.050870
28	0.150000	-0.054260
27	0.175000	-0.057000
26	0.200000	-0.059260
25	0.250000	-0.062650
24	0.300000	-0.064480
23	0.350000	-0.065170
22	0.400000	-0.064830
21	0.450000	-0.063440
20	0.500000	-0.060910
19	0.550000	-0.056830
18	0.575000	-0.053960
17	0.600000	-0.050610
16	0.625000	-0.046780
15	0.650000	-0.042650
14	0.675000	-0.038300
13	0.700000	-0.033830
12	0.725000	-0.029300
11	0.750000	-0.024610
10	0.775000	-0.020300
9	0.800000	-0.015870
8	0.825000	-0.011910
7	0.850000	-0.008520
6	0.875000	-0.005650
5	0.900000	-0.003520
4	0.925000	-0.002480
3	0.950000	-0.002570
2	0.975000	-0.003960
1	1.000000	-0.007830

internally generated estimate of leading edge point

X(IN)= 0.00200 Y(IN)= -0.00974 IN= 37
XC= 0.02136 YC= -0.00069
leading edge radious, RN = 0.02137

Airfoil shape after interpolation in slopy2

I	X	Y	dY/dX
1	1.00000	-0.00783	-0.20440
2	0.99846	-0.00752	-0.19879
3	0.99384	-0.00664	-0.18137
4	0.98618	-0.00537	-0.15044
5	0.97553	-0.00401	-0.10315
6	0.96194	-0.00300	-0.05058
7	0.94550	-0.00248	-0.01697
8	0.92632	-0.00246	0.01577
9	0.90451	-0.00325	0.05653
10	0.88020	-0.00513	0.09610
11	0.85355	-0.00808	0.12293
12	0.82472	-0.01195	0.14645

```
  13      0.79389  -0.01694   0.17692
  14      0.76125  -0.02265   0.17042
  15      0.72700  -0.02893   0.18827
  16      0.69134  -0.03538   0.17927
  17      0.65451  -0.04188   0.17160
  18      0.61672  -0.04809   0.15625
  19      0.57822  -0.05356   0.12693
  20      0.53923  -0.05789   0.09288
  21      0.50000  -0.06091   0.06366
  22      0.46077  -0.06300   0.04346
  23      0.42178  -0.06436   0.02638
  24      0.38328  -0.06506   0.01022
  25      0.34549  -0.06515  -0.00540
  26      0.30866  -0.06467  -0.02049
  27      0.27300  -0.06366  -0.03711
  28      0.23875  -0.06203  -0.05922
  29      0.20611  -0.05976  -0.07942
  30      0.17528  -0.05703  -0.09830
  31      0.14645  -0.05381  -0.12751
  32      0.11980  -0.05011  -0.14721
  33      0.09549  -0.04621  -0.17860
  34      0.07368  -0.04179  -0.23093
  35      0.05450  -0.03693  -0.27172
  36      0.03806  -0.03210  -0.34047
  37      0.02447  -0.02667  -0.44665
  38      0.01382  -0.02131  -0.58795
  39      0.00616  -0.01569  -0.99951
  40      0.00154  -0.00864  -2.62162
  41      0.00000   0.00000 -51.15408
  42      0.00154   0.01144  51.67010
  43      0.00616   0.02240   3.61813
  44      0.01382   0.03207   1.65629
  45      0.02447   0.04126   1.02313
  46      0.03806   0.05005   0.74407
  47      0.05450   0.05796   0.55767
  48      0.07368   0.06517   0.42184
  49      0.09549   0.07186   0.33808
  50      0.11980   0.07794   0.27773
  51      0.14645   0.08346   0.22582
  52      0.17528   0.08852   0.19111
  53      0.20611   0.09289   0.15839
  54      0.23875   0.09666   0.12792
  55      0.27300   0.09978   0.10354
  56      0.30866   0.10221   0.07915
  57      0.34549   0.10394   0.05769
  58      0.38328   0.10485   0.03569
  59      0.42178   0.10497   0.01334
  60      0.46077   0.10429  -0.00698
  61      0.50000   0.10269  -0.02859
  62      0.53923   0.10007  -0.05335
  63      0.57822   0.09639  -0.08013
  64      0.61672   0.09138  -0.11084
  65      0.65451   0.08525  -0.14833
  66      0.69134   0.07818  -0.17759
  67      0.72700   0.07051  -0.20459
  68      0.76125   0.06248  -0.22600
  69      0.79389   0.05445  -0.24141
  70      0.82472   0.04651  -0.25101
  71      0.85355   0.03888  -0.26228
  72      0.88020   0.03173  -0.26695
  73      0.90451   0.02517  -0.26948
  74      0.92632   0.01929  -0.26948
  75      0.94550   0.01409  -0.27014
  76      0.96194   0.00961  -0.27205
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```
   77      0.97553   0.00590  -0.27349
   78      0.98618   0.00300  -0.27251
   79      0.99384   0.00092  -0.27123
   80      0.99846  -0.00032  -0.27057
   81      1.00000  -0.00074  -0.27028

  do you want to modify this airfoil? (Y/N):
y

  do you want to add a bump to this airfoil? (Y/N):
y

  upper (1) or lower(0) surface?
1

  input begining, middle and end of bump
.05,.5,.9

  input size of bump:

      + adds to thickness
      - subtracts from thickness
.03

    Airfoil modification

      I           X/C       Y/C baseline    delta Y/C        Y/C
     41         0.00000       0.00000       0.00000       0.00000
     42         0.00154       0.01144       0.00000       0.01144
     43         0.00616       0.02240       0.00000       0.02240
     44         0.01382       0.03207       0.00000       0.03207
     45         0.02447       0.04126       0.00000       0.04126
     46         0.03806       0.05005       0.00000       0.05005
     47         0.05450       0.05796       0.00000       0.05796
     48         0.07368       0.06517       0.00003       0.06520
     49         0.09549       0.07186       0.00021       0.07208
     50         0.11980       0.07794       0.00070       0.07864
     51         0.14645       0.08346       0.00168       0.08514
     52         0.17528       0.08852       0.00330       0.09183
     53         0.20611       0.09289       0.00566       0.09854
     54         0.23875       0.09666       0.00874       0.10540
     55         0.27300       0.09978       0.01243       0.11221
     56         0.30866       0.10221       0.01649       0.11870
     57         0.34549       0.10394       0.02059       0.12453
     58         0.38328       0.10485       0.02434       0.12920
     59         0.42178       0.10497       0.02736       0.13234
     60         0.46077       0.10429       0.02932       0.13361
     61         0.50000       0.10269       0.03000       0.13269
     62         0.53923       0.10007       0.02914       0.12922
     63         0.57822       0.09639       0.02669       0.12308
     64         0.61672       0.09138       0.02297       0.11435
     65         0.65451       0.08525       0.01848       0.10372
     66         0.69134       0.07818       0.01376       0.09194
     67         0.72700       0.07051       0.00935       0.07986
     68         0.76125       0.06248       0.00566       0.06813
     69         0.79389       0.05445       0.00292       0.05737
     70         0.82472       0.04651       0.00119       0.04770
     71         0.85355       0.03888       0.00031       0.03920
     72         0.88020       0.03173       0.00003       0.03176
     73         0.90451       0.02517       0.00000       0.02517
     74         0.92632       0.01929       0.00000       0.01929
     75         0.94550       0.01409       0.00000       0.01409
     76         0.96194       0.00961       0.00000       0.00961
     77         0.97553       0.00590       0.00000       0.00590
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```
     78         0.98618       0.00300       0.00000       0.00300
     79         0.99384       0.00092       0.00000       0.00092
     80         0.99846      -0.00032       0.00000      -0.00032

  do you want to deflect the trailing edge? (Y/N):
y

  What is the x/c of the start of the deflection?
.8

  what is the deflection, in degrees?
15.

   Lower Surface deflected

     i       x(i)       y-old      delta y      y-new
     1     1.00000    -0.00783     0.05359    -0.06142
     2     0.99846    -0.00752     0.05318    -0.06070
     3     0.99384    -0.00664     0.05194    -0.05858
     4     0.98618    -0.00537     0.04989    -0.05526
     5     0.97553    -0.00401     0.04703    -0.05105
     6     0.96194    -0.00300     0.04339    -0.04639
     7     0.94550    -0.00248     0.03899    -0.04147
     8     0.92632    -0.00246     0.03385    -0.03630
     9     0.90451    -0.00325     0.02800    -0.03125
    10     0.88020    -0.00513     0.02149    -0.02662
    11     0.85355    -0.00808     0.01435    -0.02243
    12     0.82472    -0.01195     0.00662    -0.01858

   Upper Surface deflected

     i       x(i)       y-old      delta y      y-new
    70     0.82472     0.04770     0.00662     0.04108
    71     0.85355     0.03920     0.01435     0.02485
    72     0.88020     0.03176     0.02149     0.01027
    73     0.90451     0.02517     0.02800    -0.00283
    74     0.92632     0.01929     0.03385    -0.01455
    75     0.94550     0.01409     0.03899    -0.02489
    76     0.96194     0.00961     0.04339    -0.03378
    77     0.97553     0.00590     0.04703    -0.04114
    78     0.98618     0.00300     0.04989    -0.04689
    79     0.99384     0.00092     0.05194    -0.05102
    80     0.99846    -0.00032     0.05318    -0.05350
    81     1.00000    -0.00074     0.05359    -0.05433

   setting up coefficient matrix - takes some time


   Computing LU decomposition - may take awhile

  input alpha in degrees
2.

   Pressure and Velocity distributions

   I          X          Y          CP         U/Ue
   1       0.9992    -0.0611     0.41670     -0.7637
   2       0.9962    -0.0596     0.51302     -0.6978
   3       0.9900    -0.0569     0.60839     -0.6258
   4       0.9809    -0.0532     0.63092     -0.6075
   5       0.9687    -0.0487     0.60386     -0.6294
   6       0.9537    -0.0439     0.57453     -0.6523
   7       0.9359    -0.0389     0.57245     -0.6539
   8       0.9154    -0.0338     0.57498     -0.6519
```

9	0.8924	-0.0289	0.57777	-0.6498
10	0.8669	-0.0245	0.59221	-0.6386
11	0.8391	-0.0205	0.63641	-0.6030
12	0.8093	-0.0178	0.67164	-0.5730
13	0.7776	-0.0198	0.58930	-0.6409
14	0.7441	-0.0258	0.53214	-0.6840
15	0.7092	-0.0322	0.47252	-0.7263
16	0.6729	-0.0386	0.41531	-0.7646
17	0.6356	-0.0450	0.35948	-0.8003
18	0.5975	-0.0508	0.30927	-0.8311
19	0.5587	-0.0557	0.27221	-0.8531
20	0.5196	-0.0594	0.25583	-0.8627
21	0.4804	-0.0620	0.25355	-0.8640
22	0.4413	-0.0637	0.25645	-0.8623
23	0.4025	-0.0647	0.26273	-0.8586
24	0.3644	-0.0651	0.27258	-0.8529
25	0.3271	-0.0649	0.28574	-0.8451
26	0.2908	-0.0642	0.30098	-0.8361
27	0.2559	-0.0628	0.32177	-0.8235
28	0.2224	-0.0609	0.35146	-0.8053
29	0.1907	-0.0584	0.38532	-0.7840
30	0.1609	-0.0554	0.42540	-0.7580
31	0.1331	-0.0520	0.47686	-0.7233
32	0.1076	-0.0482	0.52766	-0.6873
33	0.0846	-0.0440	0.59616	-0.6355
34	0.0641	-0.0394	0.68317	-0.5629
35	0.0463	-0.0345	0.76489	-0.4849
36	0.0313	-0.0294	0.87733	-0.3502
37	0.0191	-0.0240	0.96586	-0.1848
38	0.0100	-0.0185	0.99394	0.0779
39	0.0038	-0.0122	0.71924	0.5299
40	0.0008	-0.0043	0.00089	0.9996
41	0.0008	0.0057	-0.84325	1.3577
42	0.0038	0.0169	-1.79413	1.6716
43	0.0100	0.0272	-2.45163	1.8579
44	0.0191	0.0367	-2.56550	1.8883
45	0.0313	0.0457	-2.52528	1.8776
46	0.0463	0.0540	-2.36679	1.8349
47	0.0641	0.0616	-2.11734	1.7656
48	0.0846	0.0686	-1.89645	1.7019
49	0.1076	0.0754	-1.71369	1.6473
50	0.1331	0.0819	-1.57093	1.6034
51	0.1609	0.0885	-1.49116	1.5783
52	0.1907	0.0952	-1.45244	1.5660
53	0.2224	0.1020	-1.45256	1.5661
54	0.2559	0.1088	-1.49447	1.5794
55	0.2908	0.1155	-1.56755	1.6024
56	0.3271	0.1216	-1.66552	1.6326
57	0.3644	0.1269	-1.77142	1.6648
58	0.4025	0.1308	-1.86810	1.6935
59	0.4413	0.1330	-1.94601	1.7164
60	0.4804	0.1331	-1.99347	1.7302
61	0.5196	0.1310	-1.98282	1.7271
62	0.5587	0.1261	-1.89361	1.7011
63	0.5975	0.1187	-1.71802	1.6486
64	0.6356	0.1090	-1.49638	1.5800
65	0.6729	0.0978	-1.27652	1.5088
66	0.7092	0.0859	-1.09776	1.4484
67	0.7441	0.0740	-0.99374	1.4120
68	0.7776	0.0628	-1.12848	1.4589
69	0.8093	0.0492	-0.82110	1.3495
70	0.8391	0.0330	-0.48770	1.2197
71	0.8669	0.0176	-0.31486	1.1467
72	0.8924	0.0037	-0.20068	1.0958

```
  73       0.9154   -0.0087    -0.11007      1.0536
  74       0.9359   -0.0197    -0.04075      1.0202
  75       0.9537   -0.0293     0.01110      0.9944
  76       0.9687   -0.0375     0.03867      0.9805
  77       0.9809   -0.0440     0.04913      0.9751
  78       0.9900   -0.0490     0.09990      0.9487
  79       0.9962   -0.0523     0.23071      0.8771
  80       0.9992   -0.0539     0.41671      0.7637
   I          X         Y          CP         U/Ue

    AT ALPHA =   2.000

     CL =  1.82147    CM(l.e.) = -0.76764    Cm(c/4) = -0.31257
     CD = -0.00344 (theoretically zero)

 send output to a file? (Y/N):
y

 enter file name: gaw1.out

 enter file title: GAW 1 airfoil with upper surface mod and trailing edge deflected

 Another angle of attack? (Y/N):
n

STOP
```

The output disk file generated from the above is given here (for a 44,44 panel case):

```
GAW 1 airfoil with upper surface mod and trailing edge deflected
     Alpha    CL        cmc4      CD
    2.0000    1.8253   -0.3139   -0.0034
          90.0000000
              X/C                Y/C                 Cp                U/UE
           1.0000000          -0.0614198          0.4218349          -0.7603717
           0.9987261          -0.0608210          0.4894220          -0.7145474
           0.9949107          -0.0590636          0.5828183          -0.6458961
           0.9885734          -0.0562688          0.6198552          -0.6165588
           0.9797465          -0.0526529          0.6121694          -0.6227604
           0.9684749          -0.0485395          0.5824285          -0.6461977
           0.9548160          -0.0441873          0.5709316          -0.6550332
           0.9388395          -0.0396023          0.5742147          -0.6525223
           0.9206268          -0.0348995          0.5779232          -0.6496744
           0.9002706          -0.0303699          0.5814999          -0.6469159
           0.8778748          -0.0262270          0.5949170          -0.6364613
           0.8535534          -0.0224278          0.6267794          -0.6109178
           0.8274304          -0.0189073          0.7059953          -0.5422220
           0.7996389          -0.0159320          0.6026480          -0.6303586
           0.7703204          -0.0211078          0.5561817          -0.6661969
           0.7396245          -0.0265297          0.4989320          -0.7078615
           0.7077075          -0.0324513          0.4452444          -0.7448192
           0.6747321          -0.0383475          0.3940417          -0.7784333
           0.6408663          -0.0441870          0.3435679          -0.8102050
           0.6062826          -0.0496877          0.2998845          -0.8367290
           0.5711573          -0.0544341          0.2689947          -0.8549885
           0.5356696          -0.0582109          0.2556977          -0.8627295
           0.5000000          -0.0609100          0.2539230          -0.8637575
           0.4643304          -0.0628407          0.2562625          -0.8624022
           0.4288425          -0.0641589          0.2613289          -0.8594598
           0.3937173          -0.0649298          0.2692938          -0.8548135
           0.3591337          -0.0651852          0.2802141          -0.8484020
           0.3252679          -0.0649567          0.2932411          -0.8406895
           0.2922925          -0.0642823          0.3083775          -0.8316385
           0.2603754          -0.0631488          0.3301547          -0.8184408
```

0.2296796	-0.0614624	0.3589480	-0.8006572
0.2003612	-0.0592899	0.3902262	-0.7808802
0.1725696	-0.0567585	0.4273256	-0.7567526
0.1464466	-0.0538145	0.4750733	-0.7245182
0.1221252	-0.0504530	0.5206525	-0.6923493
0.0997294	-0.0469538	0.5783747	-0.6493268
0.0793732	-0.0430568	0.6562179	-0.5863293
0.0611605	-0.0387003	0.7307052	-0.5189362
0.0451840	-0.0343281	0.8209081	-0.4231924
0.0315251	-0.0296737	0.9181719	-0.2860562
0.0202535	-0.0247229	0.9870794	-0.1136685
0.0114266	-0.0198401	0.9721012	0.1670296
0.0050893	-0.0145438	0.6358421	0.6034549
0.0012739	-0.0078949	-0.0395444	1.0195805
0.0000000	0.0000000	-0.8027386	1.3426610
0.0012739	0.0104299	-1.6840084	1.6382943
0.0050893	0.0205191	-2.3751559	1.8371598
0.0114266	0.0295006	-2.5661790	1.8884330
0.0202535	0.0379599	-2.5584900	1.8863961
0.0315251	0.0461391	-2.4712462	1.8631281
0.0451840	0.0537536	-2.2740183	1.8094249
0.0611605	0.0606522	-2.0435944	1.7445900
0.0793732	0.0671033	-1.8532349	1.6891521
0.0997294	0.0732909	-1.6915706	1.6406007
0.1221252	0.0792271	-1.5635967	1.6011236
0.1464466	0.0851389	-1.4915837	1.5784751
0.1725696	0.0912161	-1.4534186	1.5663393
0.2003612	0.0973116	-1.4457374	1.5638853
0.2296796	0.1035252	-1.4751878	1.5732729
0.2603755	0.1097611	-1.5325123	1.5913869
0.2922925	0.1158108	-1.6132200	1.6165457
0.3252679	0.1214624	-1.7096776	1.6461098
0.3591337	0.1263813	-1.8051412	1.6748556
0.3937174	0.1302163	-1.8901043	1.7000307
0.4288426	0.1327159	-1.9578166	1.7198304
0.4643304	0.1336181	-1.9988899	1.7317303
0.5000000	0.1326900	-1.9909948	1.7294493
0.5356696	0.1296440	-1.9168615	1.7078822
0.5711575	0.1243886	-1.7714504	1.6647674
0.6062827	0.1169697	-1.5728503	1.6040107
0.6408663	0.1077561	-1.3658797	1.5381416
0.6747321	0.0973867	-1.1803569	1.4766032
0.7077075	0.0864435	-1.0399497	1.4282681
0.7396246	0.0755168	-0.9781721	1.4064751
0.7703204	0.0650848	-1.1870403	1.4788646
0.7996388	0.0555373	-0.7750797	1.3323212
0.8274304	0.0395294	-0.4784321	1.2159079
0.8535534	0.0248468	-0.3243269	1.1507940
0.8778748	0.0115267	-0.2185851	1.1038954
0.9002706	-0.0005504	-0.1328125	1.0643367
0.9206268	-0.0114915	-0.0640643	1.0315349
0.9388395	-0.0212971	-0.0094062	1.0046921
0.9548160	-0.0299273	0.0304447	0.9846600
0.9684749	-0.0373215	0.0494097	0.9749822
0.9797465	-0.0434152	0.0697593	0.9644899
0.9885734	-0.0481765	0.1362851	0.9293627
0.9949107	-0.0515903	0.2603474	0.8600306
0.9987261	-0.0536442	0.4218340	0.7603723