D.7 DesCam User's Manual

This program provides the camber line required to obtain the user input chord loading distribution for two-dimensional incompressible flow using thin airfoil theory. Lan's quasi vortex lattice method is used.

The program prompts the user for the name of the data set defining the chord load of interest.

The user is also prompted to enter the number of points at which a solution is required. Fifty is enough for an extremely accurate answer. The maximum is 121.

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	FNQ	number of x/c, ΔCp pairs describing design chord load (the maximum is 101)
3	1	XQ	the x/c input station for a given chord load
	2	DC	the design chord load at this x/c

************ CARD 3 is repeated FNQ times ************

Sample input:

```
NACA 6 series a = .4 mean line loading
 3.0
   0.0      1.42857
   0.4      1.42857
   1.0      0.00000
```

Sample output:

```
enter name of input data file
descam.inp

 camber line design using quasi-vortex lattice method

 case title:  NACA 6 series a = .4 mean line loading

  design chord load

   n          x/c         Delta Cp
   1        0.00000        1.4286
   2        0.40000        1.4286
   3        1.00000        0.0000

       CL =   1.0000     Cm =   0.0357

enter the number of points to be computed:

30.

  Design angle of attack =   3.4113 degrees
```

i	x/c	z/c	dz/dx	(z-z0)/c
0	0.00000	0.05961	1.07277	0.000000
1	0.00274	0.06192	0.61767	0.002478
2	0.01093	0.06636	0.46497	0.007398
3	0.02447	0.07203	0.37212	0.013875
4	0.04323	0.07837	0.30444	0.021338
5	0.06699	0.08496	0.25031	0.029344
6	0.09549	0.09144	0.20439	0.037524
7	0.12843	0.09750	0.16374	0.045550
8	0.16543	0.10287	0.12646	0.053125
9	0.20611	0.10730	0.09118	0.059976
10	0.25000	0.11054	0.05671	0.065838
11	0.29663	0.11237	0.02174	0.070447
12	0.34549	0.11252	-0.01581	0.073504
13	0.39604	0.11052	-0.06321	0.074520
14	0.44774	0.10600	-0.11174	0.073080
15	0.50000	0.09932	-0.14406	0.069511
16	0.55226	0.09115	-0.16858	0.064456
17	0.60396	0.08195	-0.18725	0.058341
18	0.65451	0.07213	-0.20102	0.051540
19	0.70337	0.06208	-0.21052	0.044399
20	0.75000	0.05213	-0.21624	0.037228
21	0.79389	0.04259	-0.21864	0.030300
22	0.83457	0.03370	-0.21813	0.023843
23	0.87157	0.02569	-0.21515	0.018032
24	0.90451	0.01868	-0.21016	0.012991
25	0.93301	0.01279	-0.20365	0.008792
26	0.95677	0.00804	-0.19616	0.005459
27	0.97553	0.00443	-0.18831	0.002972
28	0.98907	0.00193	-0.18084	0.001279
29	0.99726	0.00047	-0.17476	0.000311
30	1.00000	0.00000	-0.17179	0.000000

```
STOP
```

Note: The data in the *z/c* column is the surface shape including both angle of attack and camber. This means that the surface starts at positive (normally) value of *z.* To obtain a traditional camber line distribution that starts and stops at z = 0, the shape is rotated "down" by the value of the design angle of attack. The result is given in the column listed as *(z-z*0*)/c*, which is now a pure camber surface, with the camber at both the leading and trailing edges equal to zero. The equations are given in Section 6.11 of the text. In particular, see Eq. (6-109) for the details of the "rotation".