D.3 Program LIDRAG

This program computes the span *e* for a single planar lifting surface given the spanload. It uses the spanload to determine the "*e*" using a Fast Fourier Transform. Numerous other methods could be used. For reference, note that the "*e*" for an elliptic spanload is 1.0, and the "*e*" for a triangular spanload is .72. The code is in the file LIDRAG.F. The sample input is also on the disk and is called B2LDG.INP. The program prompts the user for the name of the input file.

The program was written by Dave Ives, and entered the public domain through the code contained in AFFDL-TR-77-122, "An Automated Procedure for Computing the Three Dimensional Transonic Flow over Wing-Body Combinations, Including Viscous Effects," Feb. 1978.

The input is the spanload obtained from any method. The output is the Trefftz plane induced drag *e* and the integral of the spanload, which produces the C_L. This is the "span" *e*. You should include a point at $\eta = 0$ and at $\eta = 1$ you should include a point with zero spanload. See the sample input for an example.

The input instruction:

Card	Field	Columns	Variable	Description
1	1	1-10	FSPN	Number of spanwise stations of input
2	1	1-10	ETA	The spanwise location of input, y/(b/2).
2	1	1-20	CCLCA	The spanload, ccl/ca (the local chord times the local lift coefficient divided by the average chord)

Note: card 2 is repeated FSPN times

Sample input: (from the output of the **VLMpc** sample case for the B-2, and in the file B2LDG.INP on the disk))

```
 20.
0.0       0.58435
0.01805   0.58435
0.06388   0.57919
0.11943   0.56800
0.17664   0.55739
0.23385   0.54709
0.30271   0.52459
0.37158   0.48623
0.42713   0.44590
0.48269   0.40097
0.53925   0.36490
0.59581   0.34718
0.65137   0.33280
0.70693   0.31865
0.76248   0.30225
0.81804   0.27971
0.86735   0.24229
0.91667   0.18494
0.97222   0.09480
1.000     0.000
```

Sample output:

```
 Program LIDRAG

 enter name of input data file
b2ldg.inp


    LIDRAG - LIFT INDUCED DRAG ANALYSIS

     INPUT SPANLOAD

        N     Y/(B/2)      CCLCA
        1     0.00000     0.58435
        2     0.01805     0.58435
        3     0.06388     0.57919
        4     0.11943     0.56800
        5     0.17664     0.55739
        6     0.23385     0.54709
        7     0.30271     0.52459
        8     0.37158     0.48623
        9     0.42713     0.44590
       10     0.48269     0.40097
       11     0.53925     0.36490
       12     0.59581     0.34718
       13     0.65137     0.33280
       14     0.70693     0.31865
       15     0.76248     0.30225
       16     0.81804     0.27971
       17     0.86735     0.24229
       18     0.91667     0.18494
       19     0.97222     0.09480
       20     1.00000     0.00000

    Span e =    0.94708     CL =    0.399

STOP
```