Nonuniqueness of FCPOT Numerical Solution

(Note by the Editors)

After the Workshop Steinhoff and Jameson devised an example to test whether Jameson's FCPOT method could in fact produce a nonunique solution. Jameson informs us that when he applies his method to an airfoil with a cusped trailing edge (They claim a similar result can be obtained on the NACA 0012 airfoil also) AND inforces symmetry on his trailing edge condition he obtains the symmetric solution displayed in Fig. 1. But if he applies his method as if it were an asymmetric problem, i.e., allows his usual trailing edge procedure to operate, he obtains not the expected symmetric solution, but the one shown in Fig. 2. In both cases the log of the residues is under -11, evidently both are bona fide solutions to the difference equations.

Fig. 1.

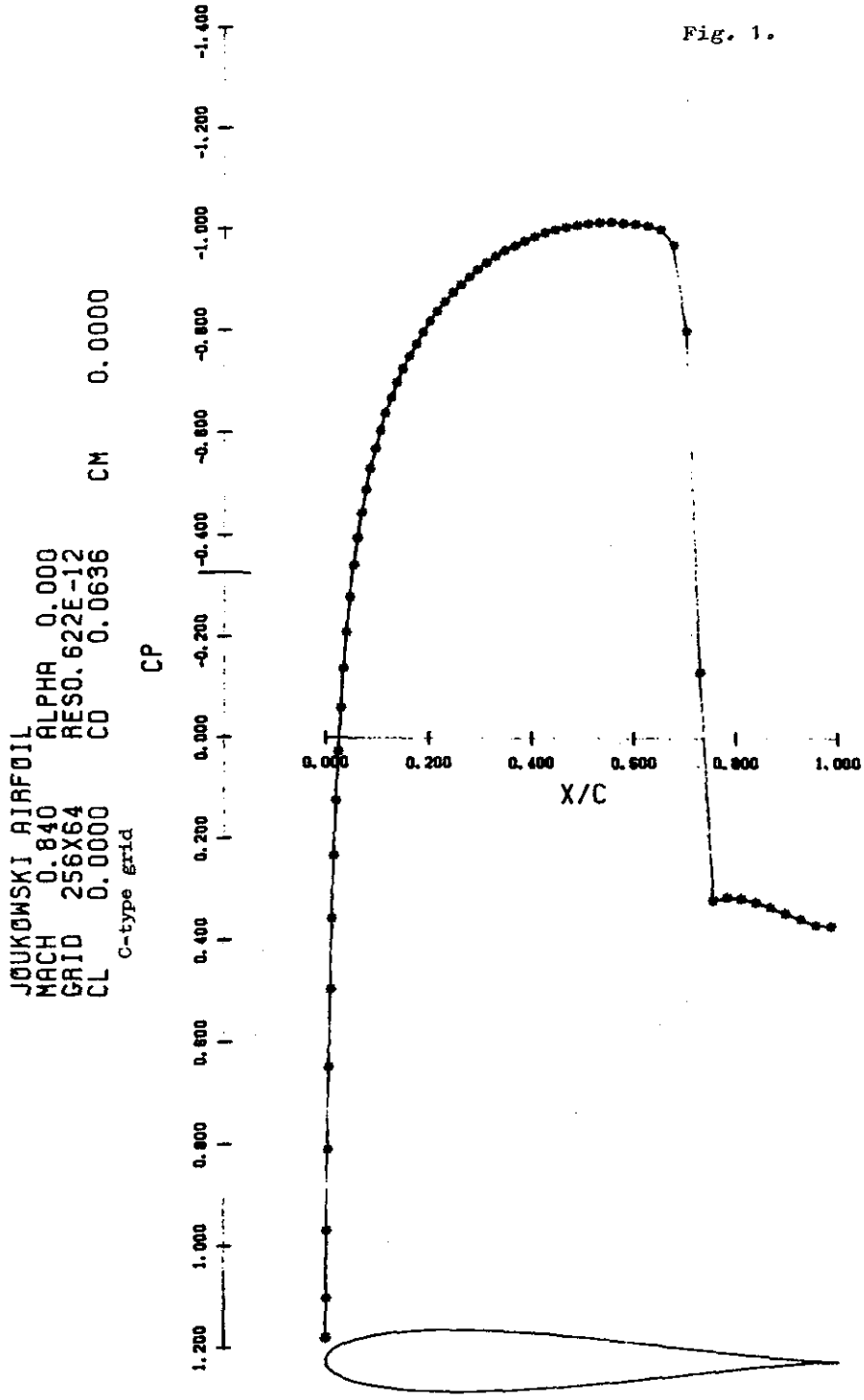
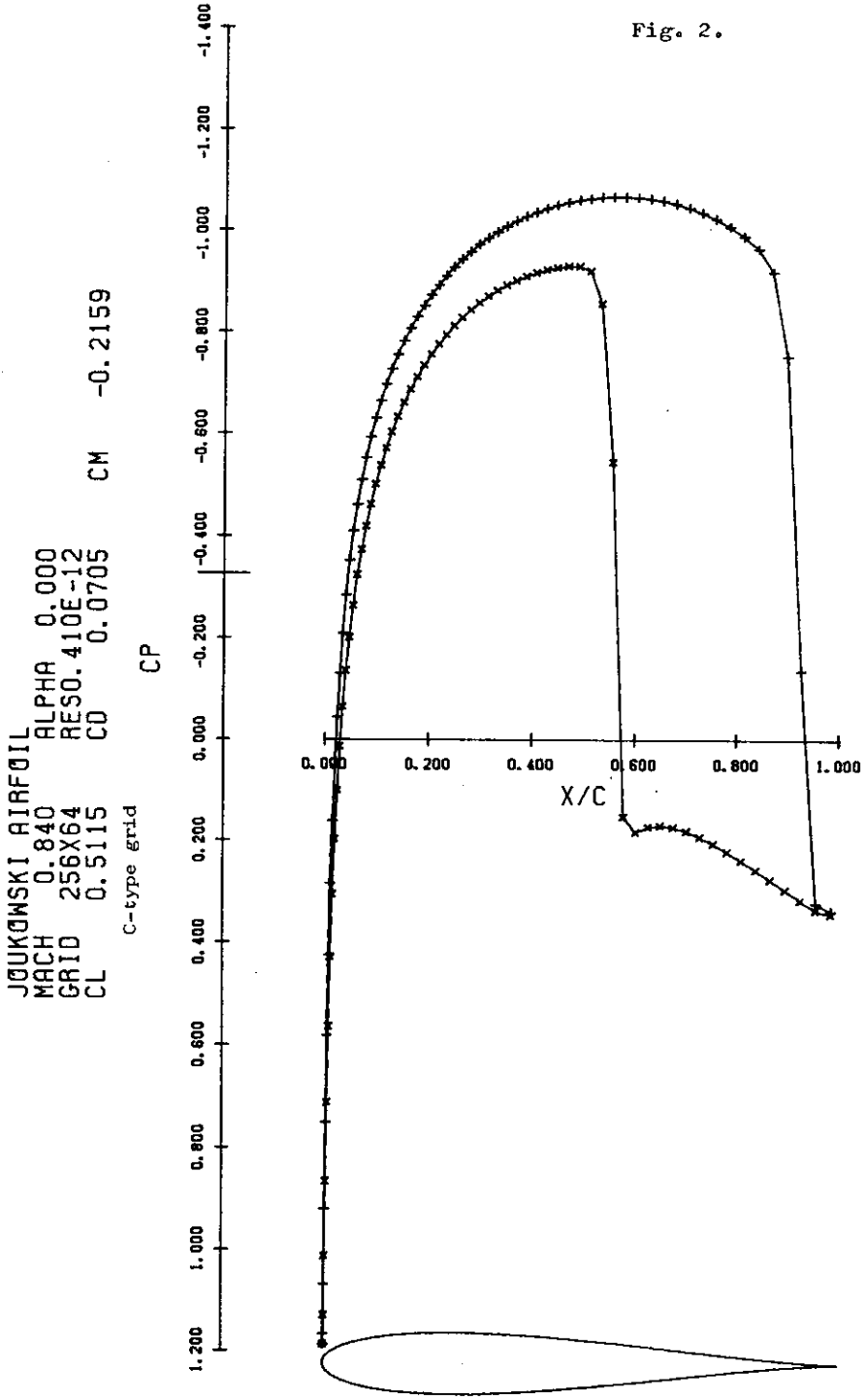

JOUKOWSKI AIRFOIL
MACH 0.840 ALPHA 0.000
GRID 256X64 RESO.622E-12
CL 0.0000 CD 0.0636 CM 0.0000
C-type grid
CP
-1.400
-1.200
-1.000
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
0.000
0.200
0.400
0.600
0.800
1.000
X/C

Fig. 2.


JOUKOWSKI AIRFOIL
MACH 0.840 ALPHA 0.000
GRID 256X64 RESO.410E-12
CL 0.5115 CD 0.0705 CM -0.2159
C-type grid
CP
-1.400
-1.200
-1.000
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
0.000
0.200
0.400
0.600
0.800
1.000
X/C