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FORTRAN VIID: LICENSED RESTRICTED RIGHTS AS STATED IN LICENSE  **********, SEE DOCUMENTATION PACKAGE, 04-101M99.
  1  0000001          PROGRAM  CNS3D                                                                    1
  2                C      BY: Y. S. CHEN        CN: 8/13/1985                                          2
  3                C                                                                                   3
  4                C*****[ CURVILINEAR N-S CODE FOR 3-D INCOMPRESSIBLE FLOWS ]**********              4
  5                C                                                                                   5
  6  0000061          COMMON                                                                           6
  7                  1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),                        7
  8                  2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,                                  8
  9                  3  PP(21,18,10),W(21,18,10),TM(21,18,10)                                        9
 10                  1/PRCP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN                          10
 11                  1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)                                  11
 12                  1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),                12
 13                  2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),                     13
 14                  3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),                     14
 15                  4 TALW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO                      15
 16                  1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),                   16
 17                  2   SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),                      17
 18                  3   AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)                       18
 19  0000061          COMMON                                                                          19
 20                  1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),                      20
 21                  2   CX(21,18,10),CY(21,18,10),CZ(21,18,10),                                     21
 22                  3   EX(21,18,10),EY(21,18,10),EZ(21,18,10),                                     22
 23                  3   SX(21,18,10),SY(21,18,10),SZ(21,18,10)                                      23
 24                  1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,                    24
 25                  2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT                 25
 26  0000061          COMMON                                                                          26
 27                  1/TTRAN/TXXE(21,18,10),TXXW(21,18,10),TYYN(21,18,10),                           27
 28                  2   TYYS(21,18,10),TZZT(21,18,10),TZZB(21,18,10),                               28
 29                  3   TYXE(21,18,10),TYXW(21,18,10),TYZT(21,18,10),                               29
 30                  4   TYZS(21,18,10),TXYN(21,18,10),TXYS(21,18,10),                               30
 31                  5   TXZT(21,18,10),TXZB(21,18,10),TZXE(21,18,10),                               31
 32                  6   TZXW(21,18,10),TZYN(21,18,10),TZYS(21,18,10)                                32
 33                  1/UNSTDY/UO(21,18,10),VO(21,18,10),WO(21,18,10),DKO(21,18,10),                  33
 34                  2   DEO(21,18,10),DENO(21,18,10),TMO(21,18,10)                                  34
 35  0000061          LOGICAL INSOU,INSOV,INSOP,INSOK,INSOE,INPRO,INSOW,INSOT                         35
 36                C*****[ INPUT DATA GUIDE ]*************************************************      36
 37                C                                                                                 37
 38                C  NLIMT : MAXIMUM NO. OF ITERATIONS LIMIT                                        38
 39                C                                                                                 39
 40                C  IG    = 1 : LAMINAR                                                            40
 41                C           2 : TURBULENT (K-E MODEL)                                            41
 42                C                                                                                 42
 43                C  ISWP  : NO. OF SWEEPS FOR SOLVING THE P' EQUATION (PP).                        43
 44                C                                                                                 44
 45                C  ITT   : TOTAL NO. OF TIME STEPS.                                               45
 46                C                                                                                 46
 47                C  ALU,ALV,ALW,ALP,ALK,ALE,ALVIS,ALC : UNDER-RELAXATION FACTORS                    47
 48                C                                                                                 48
 49                C  RENL  : REFERENCE REYNOLDS NUMBER.                                             49
 50                C                                                                                 50
 51                C  DTT   : TIME STEP FOR UNSTEADY PROBLEMS.                                       51
 52                C                                                                                 52
 53                C*****************************************************************************  53
 54                C-----INPUT DATA (PROBLEM CONTROL SETTING)                                         54
 55  0000061          READ(5,100) NLIMT,IG,ISWP,ITT                                                   55        1
 56  0000301          READ(5,200) ALU,ALV,ALW,ALP,ALK,ALE,ALVIS,ALC                                   56        2
 57  00006CI          READ(5,200) RENL,DTT                                                            57        3
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 58                C-----CONSTANTS                                                                  58
 59  000090I             EREXT=1.E-3                                                               59        4
 60  00009CI             ISWL=7                                                                    60        5
 61  0000A4I             ISWV=7                                                                    61        6
 62  0000ACI             ISWW=7                                                                    62        7
 63  0000B4I             ISWK=5                                                                    63        8
 64  0000BCI             ISWE=5                                                                    64        9
 65  0000C4I             DENIN=1.0                                                                 65       10
 66  0000D0I             VISC=1./RENL                                                              66       11
 67  0000E2I             SIGL=1.0                                                                  67       12
 68  0000EEI             SIGK=1.0                                                                  68       13
 69  0000FAI             SIGE=1.3                                                                  69       14
 70  000106I             CMU=0.09                                                                  70       15
 71  000112I             C1=1.43                                                                   71       16
 72  00011EI             C2=1.92                                                                   72       17
 73  00012AI             E=9.01069                                                                 73       18
 74  000136I             CK=0.4                                                                    74       19
 75  000142I             PI=3.141592654                                                            75       20
 76  00014EI             RINLM=1.E30                                                               76       21
 77  00015AI             SMNLM=1.E-30                                                              77       22
 78  000166I             CMU1=CMU**0.25                                                            78       23
 79  00017EI             CMU2=CMU**0.75                                                            79       24
 80  000196I             INSCU=.TRUE.                                                              80       25
 81  00019EI             INSCV=.TRUE.                                                              81       26
 82  0001A6I             INSCP=.TRUE.                                                              82       27
 83  0001AEI             INSCK=.TRUE.                                                              83       28
 84  0001B6I             INSCE=.TRUE.                                                              84       29
 85  0001BEI             INPRO=.TRUE.                                                              85       30
 86  0001C6I             INSCW=.TRUE.                                                              86       31
 87  0001CEI             INSCT=.FALSE.                                                             87       32
 88  0001D6I             IF(IG .EQ. 2) GO TO 10                                                    88       33
 89  0001ECI             INSCK=.FALSE.                                                             89       35
 90  0001F4I             INSCE=.FALSE.                                                             90       36
 91  0001FCI             INPRO=.FALSE.                                                             91       37
 92  000204I           10  CONTINUE                                                                92       38
 93                C*****[READ IN INITIAL FLOW FIELDS FROM RESTART FILE (LU = 8)]********          93
 94  000204I             READ(8,100) L,M,N,L1,L2,M1,M2,N1,N2                                       94       39
 95  000244I             LO=L+1                                                                    95       40
 96  000252I             MO=M+1                                                                    96       41
 97  000260I             NO=N+1                                                                    97       42
 98  00026EI             LT=L-1                                                                    98       43
 99  00027CI             MT=M-1                                                                    99       44
100  00028AI             NT=N-1                                                                   100       45
101                C-----INITIALIZE VARIABLES                                                     101
102  000298I             CALL INIT                                                                102       46
103                C-----RESTART FILE                                                             103
104  0002A0I             DO 50 K=1,N                                                              104       47
105  000284I             DO 50 I=1,L                                                              105       48
106  0002C8I             READ(8,400)                                                              106       49
107  0002E4I             DO 50 J=1,M                                                              107       50
108  0002F8I             READ(8,500) X(I,J,K),Y(I,J,K),Z(I,J,K),U(I,J,K),V(I,J,K),               108       51
109                     1 W(I,J,K),P(I,J,K),TM(I,J,K),DK(I,J,K),DE(I,J,K),                       109
110                     2 VISETM,DENTM                                                           110
111  000588I             UO(I,J,K)=U(I,J,K)                                                       111       52
112  000604I             VO(I,J,K)=V(I,J,K)                                                       112       53
113  000650I             WO(I,J,K)=W(I,J,K)                                                       113       54
114  00069CI             TMO(I,J,K)=TM(I,J,K)                                                     114       55
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000E8I          DKO(I,J,K)=DK(I,J,K)                                                    115      56
000734I         DEO(I,J,K)=DE(I,J,K)                                                    116      57
000780I         DENO(I,J,K)=DEN(I,J,K)                                                  117      58
0007CCI      50 CONTINUE                                                                118      59
             C*************************************************************************  119
             C-----GET BOUNDARY CONTROL PARAMETERS                                      120
000814I         CALL DIRCOS                                                             121      60
             C-----SET BOUNDARY TURBULENCE QUANTITIES TO ZERO                           122
00081CI         DO 121 I=1,L                                                            123      61
000830I         DO 121 J=1,M                                                            124      62
000844I         DO 121 K=1,N                                                            125      63
000858I         IF(MC(I,J,K) .NE. 0) GO TO 122                                          126      64
00088EI         GO TO 121                                                               127      66
000894I    122  DK(I,J,K)=0.0                                                           128      67
0008C0I         DE(I,J,K)=0.0                                                           129      68
0008ECI         U(I,J,K)=0.0                                                            130      69
000918I         V(I,J,K)=0.0                                                            131      70
000944I         W(I,J,K)=0.0                                                            132      71
000970I    121  CONTINUE                                                                133      72
             C-----CALCULATE GRID TRANSFORMATION COEFFICIENTS                           134
000988I         CALL TRANF                                                              135      73
             C-----TURBULENT VISCOSITY                                                  136
0009C0I         IF(INPRC) CALL NEWVIS                                                   137      74
             C-----CALCULATE INLET MASS FLOW RATE                                       138
0009D4I         FLOWIN=0.0                                                              139      76
0009E0I         I=1                                                                     140      77
0009E8I         DO 45 J=2,M                                                             141      78
0009FCI         DO 45 K=2,N                                                             142      79
000A10I         UC=(U(I,J,K)+U(I,J-1,K)+U(I,J,K-1)+U(I,J-1,K-1))*0.25                   143      80
000AC0I         DENC=(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I,J,K-1)+DEN(I,J-1,K-1))*0.25         144      81
000B70I         P1=(X(I,J,K)+X(I,J,K-1)-X(I,J-1,K)-X(I,J-1,K-1))*0.5                    145      82
000C20I         P2=(Y(I,J,K)+Y(I,J,K-1)-Y(I,J-1,K)-Y(I,J-1,K-1))*0.5                    146      83
000CD0I         P3=(Z(I,J,K)+Z(I,J,K-1)-Z(I,J-1,K)-Z(I,J-1,K-1))*0.5                    147      84
000D80I         Q1=(X(I,J,K)+X(I,J-1,K)-X(I,J,K-1)-X(I,J-1,K-1))*0.5                    148      85
000E30I         Q2=(Y(I,J,K)+Y(I,J-1,K)-Y(I,J,K-1)-Y(I,J-1,K-1))*0.5                    149      86
000EE0I         Q3=(Z(I,J,K)+Z(I,J-1,K)-Z(I,J,K-1)-Z(I,J-1,K-1))*0.5                    150      87
000F90I         AREA=SQRT(P1*P1+P2*P2+P3*P3)*SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                     151      88
00102CI         FLOWIN=FLOWIN+DENC*AREA*UC                                              152      89
00104AI      45 CONTINUE                                                                153      90
00107AI         ITO=1                                                                   154      91
             C-----TRANSIENT PROCESS                                                    155
001032I      2  CONTINUE                                                                156      92
001082I         CALL SYMOUT(3,1,2,L,2,M,2,N)                                            157      93
00100CI         ITER=1                                                                  158      94
             C-----SOLUTION PROCEDURES START                                            159
0010E4I      1  CONTINUE                                                                160      95
0010E4I         CALL SYMOUT(1,1,2,LT,2,MT,2,NT)                                         161      96
001140I         IF(INSOU) CALL SOLVEQ(1,ISWU,ALU,SIGU,ERRU,U,UC)                        162      97
001184I         IF(INSOV) CALL SOLVEQ(2,ISWV,ALV,SIGU,ERRV,V,VO)                        163      99
0011C8I         IF(INSOW) CALL SOLVEQ(3,ISWW,ALW,SIGU,ERRW,W,WO)                        164     101
00120CI         IF(INSOT) CALL SOLVEQ(4,ISWW,ALW,SIGU,ERRW,TM,TMO)                      165     103
001250I         IF(INSOK) CALL SOLVEQ(5,ISWK,ALK,SIGK,ERRK,DK,DKO)                      166     105
001294I         IF(INSOE) CALL SOLVEQ(6,ISWE,ALE,SIGE,ERRE,DE,DEO)                      167     107
001208I         IF(INSOP) CALL SOLVEQ(0,ISWP,ALP,SIGU,ERRM,PP,PP)                       168     109
00131CI         IF(INPRC) CALL NEWVIS                                                   169     111
             C-----CONVERGENCE CHECK                                                    170
001330I         WRITE(6,300) ITER,ERRU,ERRV,ERRW,ERRM,ERRK,ERRE,U(7,2,6)                171     113
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172  00136CI          ERRMAX=ERRM+ERRU+ERRV+ERRW                                                    172      114
173  00138AI          IF(ITER .GE. 20 .AND. ERRMAX .GT. 1.E03) GO TO 99                             173      115
174  0013B2I          IF(ITER .GE. NLIMT .OR. ERRMAX .LE. EREXT) GO TO 99                           174      117
175  0013DCI          ITER=ITER+1                                                                   175      119
176  0013EAI          GO TO 1                                                                       176      120
177                C-----PRINT OUT SOLUTIONS                                                       177
178  0013EEI       99 CONTINUE                                                                      178      121
179  0013EEI          WRITE(7,100) L,M,N,L1,L2,M1,M2,N1,N2                                          179      122
180  00142CI          DO 901 K=1,N                                                                  180      123
181  001440I          DO 901 I=1,L                                                                  181      124
182  001454I          WRITE(7,400)                                                                  182      125
183  001470I          DO 902 J=1,M                                                                  183      126
184  001484I          XV=X(I,J,K)                                                                   184      127
185  0014B0I          YV=Y(I,J,K)                                                                   185      128
186  0014DCI          ZV=Z(I,J,K)                                                                   186      129
187  001508I          WRITE(7,500) XV,YV,ZV,U(I,J,K),V(I,J,K),W(I,J,K),P(I,J,K),                    187      130
188                1           TM(I,J,K),DK(I,J,K),DE(I,J,K),VISE(I,J,K),DEN(I,J,K)                188
189  0016E8I      902 CONTINUE                                                                     189      131
190  001700I      901 CONTINUE                                                                     190      132
191  001730I          TIMT=DTT*ITC                                                                  191      133
192  001744I          WRITE(7,300) ITC,TIMT                                                         192      134
193  001768I          IF(ITC .GE. ITT .OR. DTT .EQ. 0.0) GO TO 999                                  193      135
194  001792I          ITC=ITC+1                                                                     194      137
195  0017A0I          GO TO 2                                                                       195      138
196  0017A4I      999 CONTINUE                                                                     196      139
197  0017A4I      100 FORMAT(9I5)                                                                  197
198  0017B0I      200 FORMAT(11F7.4)                                                               198
199  0017BEI      300 FORMAT(1X,I5,7E10.2)                                                         199
200  0017D0I      400 FORMAT(//)                                                                   200
201  0017DAI      500 FORMAT(3F8.4,3E12.4,2X,6E11.4)                                               201
202  0017F6I          STOP                                                                          202      140
203  0017FEI          END                                                                           203      141

NO  ERRORS:F7D  R05-01.0C  MAINPROG    CNS3C     02/21/86  09:45:56  TABLE SPACE:  11 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 181 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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 1  000000I         SUBROUTINE DIRCCS                                                  204
 2  000004I         COMMON                                                             205
 3                 1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),   206
 4                 2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),        207
 5                 3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),        208
 6                 4 TAUW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO         209
 7                 1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),         210
 8                 2   CX(21,18,10),CY(21,18,10),CZ(21,18,10),                        211
 9                 3   EX(21,18,10),EY(21,18,10),EZ(21,18,10),                        212
10                 3   SX(21,18,10),SY(21,18,10),SZ(21,18,10)                         213
11                 1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LC,MO,ISWU,ISWV,ISWP,ISWK,ISWE,       214
12                 2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT    215
13              C-----SET DOMAIN BLOCKAGE CONTROL PARAMETER                           216
14              C-----SCALAR BLOCKAGE :   MC(I,J,K)=1                                 217
15              C-----PRESSURE BLOCKAGE : MC(I,J,K)=2                                 218
16  000004I         DO 10 I=1,LO                                                       219        1
17  000018I         DO 10 J=1,MO                                                       220        2
18  00002CI         DO 10 K=1,NO                                                       221        3
19  000040I         MC(I,J,K)=0                                                        222        4
20  000068I         IF(J.EQ.1.OR.J.EQ.M.OR.K.EQ.N) MC(I,J,K)=1                         223        5
21  0000C4I         IF(I.GE.L1.AND.I.LE.L2.AND.J.GE.M1.AND.J.LE.M2.AND.                224        7
22                 1   K.GE.N1.AND.K.LE.N2) MC(I,J,K)=1                               225
23  000158I         IF(I.GT.L1.AND.I.LE.L2.AND.J.GT.M1.AND.J.LE.M2.AND.                226        9
24                 1   K.GT.N1.AND.K.LE.N2) MC(I,J,K)=2                               227
25              C-----ADD BLOCKAGES AS NEEDED HERE                                    228
26  0001ECI       10  CONTINUE                                                       229       11
27              C-----CALCULATE BOUNDARY GRID SIZES AND ORIENTATIONS                  230
28  000234I         III=1                                                              231       12
29  00023CI         DO 30 I=2,LT                                                       232       13
30  000250I         DO 30 J=2,MT                                                       233       14
31  000264I         DO 30 K=2,NT                                                       234       15
32  000278I         IF(MC(I,J,K) .NE. 0) GO TO 30                                      235       16
33  0002AEI         MCT=MC(I+1,J,K)+MC(I-1,J,K)+MC(I,J+1,K)+MC(I,J-1,K)+               236       18
34                 1    MC(I,J,K+1)+MC(I,J,K-1)                                       237
35  0003ACI         IF(MCT .EQ. 0) GO TO 30                                            238       19
36  0003C2I         IF(MC(I,J+1,K) .EQ. 0) GO TO 2                                     239       21
37              C-----NORTH                                                           240
38  0003FCI         IBC(III)=I                                                         241       23
39  000410I         JBC(III)=J                                                         242       24
40  000424I         KBC(III)=K                                                         243       25
41  000438I         IITY(III)=1                                                        244       26
42  000448I         I1=I+1                                                             245       27
43  000456I         I2=I-1                                                             246       28
44  000464I         K1=K+1                                                             247       29
45  000472I         K2=K-1                                                             248       30
46  000480I         IF(I .EQ. L1) I2=I                                                 249       31
47  00049EI         IF(I .EQ. L2) I1=I                                                 250       33
48  00048CI         IF(K .EQ. N1) K2=K                                                 251       35
49  00040AI         IF(K .EQ. N2) K1=K                                                 252       37
50  0004F8I         J1=J-1                                                             253       39
51  000506I         J2=J-2                                                             254       40
52  000514I         P1=(Y(I1,J,K1)-Y(I1,J,K2))*(Z(I1,J,K2)-Z(I2,J,K))-                255       41
53                 1   (Z(I1,J,K1)-Z(I1,J,K2))*(Y(I1,J,K2)-Y(I2,J,K))                 256
54  000650I         P2=(Z(I1,J,K1)-Z(I1,J,K2))*(X(I1,J,K2)-X(I2,J,K))-                 257       42
55                 1   (X(I1,J,K1)-X(I1,J,K2))*(Z(I1,J,K2)-Z(I2,J,K))                 258
56  00078CI         P3=(X(I1,J,K1)-X(I1,J,K2))*(Y(I1,J,K2)-Y(I2,J,K))-                 259       43
57                 1   (Y(I1,J,K1)-Y(I1,J,K2))*(X(I1,J,K2)-X(I2,J,K))                 260
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 58  0008C8I          PQ=SQRT(P1*P1+P2*P2+P3*P3)                                    261       44
 59  000912I          P1=P1/PQ                                                      262       45
 60  000924I          P2=P2/PQ                                                      263       46
 61  000936I          P3=P3/PQ                                                      264       47
 62  000948I          R1=(1.-P1**2)                                                 265       48
 63  000964I          R2=(1.-P2**2)                                                 266       49
 64  000980I          R3=(1.-P3**2)                                                 267       50
 65  00099CI          SINX(III)=SQRT(R1)                                            268       51
 66  0009C2I          SINY(III)=SQRT(R2)                                            269       52
 67  0009E6I          SINZ(III)=SQRT(R3)                                            270       53
 68  000A0AI          Q1=X(I,J,K)-X(I,J1,K)                                         271       54
 69  000A5CI          Q2=Y(I,J,K)-Y(I,J1,K)                                         272       55
 70  000AAEI          Q3=Z(I,J,K)-Z(I,J1,K)                                         273       56
 71  000B00I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                     274       57
 72  000B7EI          CC=1.0                                                        275       58
 73  000B8AI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                    276       59
 74  000BD6I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                            277       60
 75  000C18I          YN(III)=BB*ABS(COTH)                                          278       61
 76  000C44I          Q1=X(I,J,K)-X(I,J2,K)                                         279       62
 77  000C96I          Q2=Y(I,J,K)-Y(I,J2,K)                                         280       63
 78  000CE8I          Q3=Z(I,J,K)-Z(I,J2,K)                                         281       64
 79  000D3AI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                    282       65
 80  000D86I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                     283       66
 81  000E02I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                            284       67
 82  000E44I          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                           285       68
 83  000E84I          IJLC(I,J,K)=III                                               286       69
 84  000E80I          III=III+1                                                     287       70
 85  000E8EI      2   CONTINUE                                                      288       71
 86  000E8EI          IF(MC(I,J-1,K) .EQ. 0) GO TO 3                                289       72
 87               C-----SOUTH                                                      290
 88  000EF8I          IBC(III)=I                                                    291       74
 89  000F0CI          JBC(III)=J                                                    292       75
 90  000F20I          KBC(III)=K                                                    293       76
 91  000F34I          IITY(III)=2                                                   294       77
 92  000F44I          I1=I+1                                                        295       78
 93  000F52I          I2=I-1                                                        296       79
 94  000F60I          K1=K+1                                                        297       80
 95  000F6EI          K2=K-1                                                        298       81
 96  000F7CI          J1=J+1                                                        299       82
 97  000F8AI          J2=J+2                                                        300       83
 98  000F98I          P1=(Y(I1,J,K1)-Y(I1,J,K2))*(Z(I1,J,K2)-Z(I2,J,K))-            301       84
 99                  1   (Z(I1,J,K1)-Z(I1,J,K2))*(Y(I1,J,K2)-Y(I2,J,K))            302
100  0010D4I          P2=(Z(I1,J,K1)-Z(I1,J,K2))*(X(I1,J,K2)-X(I2,J,K))-            303       85
101                 1   (X(I1,J,K1)-X(I1,J,K2))*(Z(I1,J,K2)-Z(I2,J,K))            304
102  001210I          P3=(X(I1,J,K1)-X(I1,J,K2))*(Y(I1,J,K2)-Y(I2,J,K))-            305       86
103                 1   (Y(I1,J,K1)-Y(I1,J,K2))*(X(I1,J,K2)-X(I2,J,K))            306
104  00134CI          PQ=SQRT(P1*P1+P2*P2+P3*P3)                                    307       87
105  001396I          P1=P1/PQ                                                      308       88
106  0013A8I          P2=P2/PQ                                                      309       89
107  0013BAI          P3=P3/PQ                                                      310       90
108  0013CCI          R1=(1.-P1**2)                                                 311       91
109  0013E8I          R2=(1.-P2**2)                                                 312       92
110  001404I          R3=(1.-P3**2)                                                 313       93
111  001420I          SINX(III)=SQRT(R1)                                            314       94
112  001446I          SINY(III)=SQRT(R2)                                            315       95
113  00146AI          SINZ(III)=SQRT(R3)                                            316       96
114  00148EI          Q1=X(I,J,K)-X(I,J1,K)                                         317       97
```

```
115  0014E0I          Q2=Y(I,J,K)-Y(I,J1,K)                                          318     98
116  001532I          Q3=Z(I,J,K)-Z(I,J1,K)                                          319     99
117  001584I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      320    100
118  001602I          CC=1.0                                                         321    101
119  00160EI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     322    102
120  00165AI          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             323    103
121  00169CI          YN(III)=BB*ABS(COTH)                                           324    104
122  0016C8I          Q1=X(I,J,K)-X(I,J2,K)                                          325    105
123  00171AI          Q2=Y(I,J,K)-Y(I,J2,K)                                          326    106
124  00176CI          Q3=Z(I,J,K)-Z(I,J2,K)                                          327    107
125  0017BEI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     328    108
126  001804I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      329    109
127  001886I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             330    110
128  0018C8I          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                            331    111
129  001903I          IJLC(I,J,K)=III                                                332    112
130  001934I          III=III+1                                                      333    113
131  001942I        3   CONTINUE                                                     334    114
132  001942I          IF(MC(I+1,J,K) .EQ. 0) GO TO 4                                 335    115
133               C-----EAST                                                        336
134  001970I          IBC(III)=I                                                     337    117
135  001990I          JBC(III)=J                                                     338    118
136  0019A4I          KBC(III)=K                                                     339    119
137  0019B8I          IITY(III)=3                                                    340    120
138  0019C8I          J1=J+1                                                         341    121
139  0019D6I          J2=J-1                                                         342    122
140  0019E4I          K1=K+1                                                         343    123
141  0019F2I          K2=K-1                                                         344    124
142  001A00I          IF(J .EQ. M1) J2=J                                             345    125
143  001A1EI          IF(J .EQ. M2) J1=J                                             346    127
144  001A3CI          IF(K .EQ. N1) K2=K                                             347    129
145  001A5AI          IF(K .EQ. N2) K1=K                                             348    131
146  001A78I          I1=I-1                                                         349    133
147  001A86I          I2=I-2                                                         350    134
148  001A94I          P1=(Y(I,J1,K1)-Y(I,J1,K2))*(Z(I,J1,K2)-Z(I,J2,K))-             351    135
149                  1   (Z(I,J1,K1)-Z(I,J1,K2))*(Y(I,J1,K2)-Y(I,J2,K))             352
150  001B00I          P2=(Z(I,J1,K1)-Z(I,J1,K2))*(X(I,J1,K2)-X(I,J2,K))-             353    136
151                  1   (X(I,J1,K1)-X(I,J1,K2))*(Z(I,J1,K2)-Z(I,J2,K))             354
152  001D0CI          P3=(X(I,J1,K1)-X(I,J1,K2))*(Y(I,J1,K2)-Y(I,J2,K))-             355    137
153                  1   (Y(I,J1,K1)-Y(I,J1,K2))*(X(I,J1,K2)-X(I,J2,K))             356
154  001E48I          PQ=SQRT(P1*P1+P2*P2+P3*P3)                                     357    138
155  001E92I          P1=P1/PQ                                                       358    139
156  001EA4I          P2=P2/PQ                                                       359    140
157  001EB6I          P3=P3/PQ                                                       360    141
158  001EC8I          R1=(1.-P1**2)                                                  361    142
159  001EE4I          R2=(1.-P2**2)                                                  362    143
160  001F00I          R3=(1.-P3**2)                                                  363    144
161  001F1CI          SINX(III)=SQRT(R1)                                             364    145
162  001F42I          SINY(III)=SQRT(R2)                                             365    146
163  001F66I          SINZ(III)=SQRT(R3)                                             366    147
164  001F8AI          Q1=X(I,J,K)-X(I1,J,K)                                          367    148
165  001FDCI          Q2=Y(I,J,K)-Y(I1,J,K)                                          368    149
166  00202EI          Q3=Z(I,J,K)-Z(I1,J,K)                                          369    150
167  002080I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      370    151
168  0020FEI          CC=1.0                                                         371    152
169  00210AI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     372    153
170  002156I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             373    154
171  002198I          YN(III)=BB*ABS(COTH)                                           374    155
```

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172  0021C4I          Q1=X(I,J,K)-X(I2,J,K)                                          375     156
173  002216I          Q2=Y(I,J,K)-Y(I2,J,K)                                          376     157
174  002268I          Q3=Z(I,J,K)-Z(I2,J,K)                                          377     158
175  0022BAI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     378     159
176  002306I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      379     160
177  002382I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             380     161
178  0023C4I          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                            381     162
179  002404I          IJLC(I,J,K)=III                                                382     163
180  002430I          III=III+1                                                      383     164
181  00243EI      4   CONTINUE                                                       384     165
182  00243EI          IF(MC(I-1,J,K) .EQ. 0) GO TO 5                                 385     166
183              C-----WEST                                                         386
184  002478I          ISC(III)=I                                                     387     168
185  00248CI          JBC(III)=J                                                     388     169
186  0024A0I          KBC(III)=K                                                     389     170
187  0024B4I          IITY(III)=4                                                    390     171
188  0024C4I          J1=J+1                                                         391     172
189  0024D2I          J2=J-1                                                         392     173
190  0024E0I          K1=K+1                                                         393     174
191  0024EEI          K2=K-1                                                         394     175
192  0024FCI          IF(J .EQ. M1) J2=J                                             395     176
193  00251AI          IF(J .EQ. M2) J1=J                                             396     178
194  002538I          IF(K .EQ. N1) K2=K                                             397     180
195  002556I          IF(K .EQ. N2) K1=K                                             398     182
196  002574I          I1=I+1                                                         399     184
197  002582I          I2=I+2                                                         400     185
198  002590I          P1=(Y(I,J1,K1)-Y(I,J1,K2))*(Z(I,J1,K2)-Z(I,J2,K))-             401     186
199                  1   (Z(I,J1,K1)-Z(I,J1,K2))*(Y(I,J1,K2)-Y(I,J2,K))             402
200  0026CCI          P2=(Z(I,J1,K1)-Z(I,J1,K2))*(X(I,J1,K2)-X(I,J2,K))-             403     187
201                  1   (X(I,J1,K1)-X(I,J1,K2))*(Z(I,J1,K2)-Z(I,J2,K))             404
202  0028D8I          P3=(X(I,J1,K1)-X(I,J1,K2))*(Y(I,J1,K2)-Y(I,J2,K))-             405     188
203                  1   (Y(I,J1,K1)-Y(I,J1,K2))*(X(I,J1,K2)-X(I,J2,K))             406
204  002944I          PQ=SQRT(P1*P1+P2*P2+P3*P3)                                     407     189
205  00298EI          P1=P1/PQ                                                       408     190
206  0029A0I          P2=P2/PQ                                                       409     191
207  0029B2I          P3=P3/PQ                                                       410     192
208  0029C4I          R1=1.-P1**2                                                    411     193
209  0029E0I          R2=1.-P2**2                                                    412     194
210  0029FCI          R3=1.-P3**2                                                    413     195
211  002A18I          SINX(III)=SQRT(R1)                                             414     196
212  002A3EI          SINY(III)=SQRT(R2)                                             415     197
213  002A62I          SINZ(III)=SQRT(R3)                                             416     198
214  002A86I          Q1=X(I,J,K)-X(I1,J,K)                                          417     199
215  002AD8I          Q2=Y(I,J,K)-Y(I1,J,K)                                          418     200
216  002B2AI          Q3=Z(I,J,K)-Z(I1,J,K)                                          419     201
217  002B7CI          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      420     202
218  002BFAI          CC=1.0                                                         421     203
219  002C06I          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     422     204
220  002C52I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             423     205
221  002C94I          YN(III)=BB*ABS(COTH)                                           424     206
222  002CC0I          Q1=X(I,J,K)-X(I2,J,K)                                          425     207
223  002D12I          Q2=Y(I,J,K)-Y(I2,J,K)                                          426     208
224  002D64I          Q3=Z(I,J,K)-Z(I2,J,K)                                          427     209
225  002D86I          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                     428     210
226  002E02I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                      429     211
227  002E7EI          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                             430     212
228  002EC0I          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                            431     213
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229  002F00I          IJLC(I,J,K)=III                                          432   214
230  002F2CI          III=III+1                                                433   215
231  002F3AI        5 CONTINUE                                                 434   216
232  002F3AI          IF(MC(I,J,K+1) .EQ. 0) GO TO 6                           435   217
233                 C-----TOP                                                  436
234  002F72I          ISC(III)=I                                               437   219
235  002F86I          JBC(III)=J                                               438   220
236  002F9AI          KBC(III)=K                                               439   221
237  002FAEI          IITY(III)=5                                              440   222
238  002FBEI          I1=I+1                                                   441   223
239  002FCCI          I2=I-1                                                   442   224
240  002FDAI          J1=J+1                                                   443   225
241  002FE8I          J2=J-1                                                   444   226
242  002FF6I          IF(I .EQ. L1) I2=I                                       445   227
243  003014I          IF(I .EQ. L2) I1=I                                       446   229
244  003032I          IF(J .EQ. M1) J2=J                                       447   231
245  003050I          IF(J .EQ. M2) J1=J                                       448   233
246  00306EI          K1=K-1                                                   449   235
247  00307CI          K2=K-2                                                   450   236
248  00308AI          P1=(Y(I1,J1,K)-Y(I1,J2,K))*(Z(I1,J2,K)-Z(I2,J,K))-       451   237
249                  1   (Z(I1,J1,K)-Z(I1,J2,K))*(Y(I1,J2,K)-Y(I2,J,K))       452
250  0031C6I          P2=(Z(I1,J1,K)-Z(I1,J2,K))*(X(I1,J2,K)-X(I2,J,K))-       453   238
251                  1   (X(I1,J1,K)-X(I1,J2,K))*(Z(I1,J2,K)-Z(I2,J,K))       454
252  003302I          P3=(X(I1,J1,K)-X(I1,J2,K))*(Y(I1,J2,K)-Y(I2,J,K))-       455   239
253                  1   (Y(I1,J1,K)-Y(I1,J2,K))*(X(I1,J2,K)-X(I2,J,K))       456
254  00343EI          PQ=SQRT(P1*P1+P2*P2+P3*P3)                               457   240
255  00348AI          P1=P1/PQ                                                 458   241
256  00349CI          P2=P2/PQ                                                 459   242
257  0034AEI          P3=P3/PQ                                                 460   243
258  0034C0I          R1=1.-P1**2                                              461   244
259  0034DCI          R2=1.-P2**2                                              462   245
260  0034F8I          R3=1.-P3**2                                              463   246
261  003514I          SINX(III)=SQRT(R1)                                       464   247
262  00353AI          SINY(III)=SQRT(R2)                                       465   248
263  00355EI          SINZ(III)=SQRT(R3)                                       466   249
264  003582I          Q1=X(I,J,K)-X(I,J,K1)                                    467   250
265  0035D4I          Q2=Y(I,J,K)-Y(I,J,K1)                                    468   251
266  003626I          Q3=Z(I,J,K)-Z(I,J,K1)                                    469   252
267  003678I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                470   253
268  0036F6I          CC=1.0                                                   471   254
269  003702I          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                               472   255
270  00374EI          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                       473   256
271  003790I          YN(III)=BB*ABS(COTH)                                     474   257
272  0037BCI          Q1=X(I,J,K)-X(I,J,K2)                                    475   258
273  0037E0I          Q2=Y(I,J,K)-Y(I,J,K2)                                    476   259
274  003860I          Q3=Z(I,J,K)-Z(I,J,K2)                                    477   260
275  003882I          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                               478   261
276  0038FEI          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                479   262
277  00397AI          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                       480   263
278  0039BCI          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                      481   264
279  0039FCI          IJLC(I,J,K)=III                                          482   265
280  003A28I          III=III+1                                                483   266
281  003A36I        6 CONTINUE                                                 484   267
282  003A36I          IF(MC(I,J,K-1) .EQ. 0) GO TO 30                          485   268
283                 C-----BOTTOM                                               486
284  003A6EI          IBC(III)=I                                               487   270
285  003A82I          JBC(III)=J                                               488   271
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286  003A96I          KBC(III)=K                                                    489      272
287  003AAAI          IITY(III)=6                                                   490      273
288  003ABAI          I1=I+1                                                        491      274
289  003AC8I          I2=I-1                                                        492      275
290  003AD6I          J1=J+1                                                        493      276
291  003AE4I          J2=J-1                                                        494      277
292  003AF2I          IF(I .EQ. L1) I2=I                                            495      278
293  003B10I          IF(I .EQ. L2) I1=I                                            496      280
294  003B2EI          IF(J .EQ. M1) J2=J                                            497      282
295  003B4CI          IF(J .EQ. M2) J1=J                                            498      284
296  003B6AI          K1=K+1                                                        499      286
297  003B78I          K2=K+2                                                        500      287
298  003B86I          P1=(Y(I1,J1,K)-Y(I1,J2,K))*(Z(I1,J2,K)-Z(I2,J,K))-            501      288
299                  1    (Z(I1,J1,K)-Z(I1,J2,K))*(Y(I1,J2,K)-Y(I2,J,K))           502
300  003CC2I          P2=(Z(I1,J1,K)-Z(I1,J2,K))*(X(I1,J2,K)-X(I2,J,K))-            503      289
301                  1    (X(I1,J1,K)-X(I1,J2,K))*(Z(I1,J2,K)-Z(I2,J,K))           504
302  003DFEI          P3=(X(I1,J1,K)-X(I1,J2,K))*(Y(I1,J2,K)-Y(I2,J,K))-            505      290
303                  1    (Y(I1,J1,K)-Y(I1,J2,K))*(X(I1,J2,K)-X(I2,J,K))           506
304  003F3AI          PQ=SQRT(P1*P1+P2*P2+P3*P3)                                    507      291
305  003F86I          P1=P1/PQ                                                      508      292
306  003F98I          P2=P2/PQ                                                      509      293
307  003FAAI          P3=P3/PQ                                                      510      294
308  003FBCI          R1=1.-P1**2                                                   511      295
309  003FD8I          R2=1.-P2**2                                                   512      296
310  003FF4I          R3=1.-P3**2                                                   513      297
311  004010I          SINX(III)=SQRT(R1)                                            514      298
312  004036I          SINY(III)=SQRT(R2)                                            515      299
313  00405AI          SINZ(III)=SQRT(R3)                                            516      300
314  00407EI          Q1=X(I,J,K)-X(I,J,K1)                                         517      301
315  004000I          Q2=Y(I,J,K)-Y(I,J,K1)                                         518      302
316  004122I          Q3=Z(I,J,K)-Z(I,J,K1)                                         519      303
317  004174I          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                     520      304
318  0041F2I          CC=1.0                                                        521      305
319  0041FEI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                    522      306
320  00424AI          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                            523      307
321  00428CI          YN(III)=BB*ABS(COTH)                                          524      308
322  004288I          Q1=X(I,J,K)-X(I,J,K2)                                         525      309
323  00430AI          Q2=Y(I,J,K)-Y(I,J,K2)                                         526      310
324  00435CI          Q3=Z(I,J,K)-Z(I,J,K2)                                         527      311
325  0043AEI          BB=SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                                    528      312
326  0043FAI          AA=SQRT((Q1-P1)**2+(Q2-P2)**2+(Q3-P3)**2)                     529      313
327  004476I          COTH=(BB*BB+CC*CC-AA*AA)/(2*BB*CC)                            530      314
328  004498I          YN1(III)=(BB*ABS(COTH)+YN(III))*0.5                           531      315
329  0044F8I          IJLC(I,J,K)=III                                               532      316
330  004524I          III=III+1                                                     533      317
331  004532I     30   CONTINUE                                                      534      318
332  004580I          IITC=III-1                                                    535      319
333  00458EI          WRITE(6,100) L0,M0,N0,IITO                                    536      320
334  004598I    100   FORMAT(4I5)                                                   537
335  0045C4I          RETURN                                                        538      321
336  0045CCI          END                                                           539      322

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  CIRCCS    02/21/86  09:47:58  TABLE SPACE:   6 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 203 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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      SUBROUTINE TRANF                                                                  540
      COMMON                                                                            541
     1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),                            542
     2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,                                     543
     3  PP(21,18,10),W(21,18,10),TM(21,18,10)                                           544
     1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN                          545
     1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)                                  546
     1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),                 547
     2 YN(800),YN1(800),SINX(800),SINY(300),SINZ(300),ANW1(800),                     548
     3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),                     549
     4 TALW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO                      550
     1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),                   551
     2   SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),                       552
     3   AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)                        553
      COMMON                                                                          554
     1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),                      555
     2   CX(21,18,10),CY(21,18,10),CZ(21,18,10),                                     556
     3   EX(21,18,10),EY(21,18,10),EZ(21,18,10),                                     557
     3   SX(21,18,10),SY(21,18,10),SZ(21,18,10)                                      558
     1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,                    559
     2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT                 560
      COMMON                                                                          561
     1/TTRAN/TXXE(21,18,10),TXXW(21,18,10),TYYN(21,18,10),                           562
     2   TYYS(21,18,10),TZZT(21,18,10),TZZB(21,18,10),                               563
     3   TYXE(21,18,10),TYXW(21,18,10),TYZT(21,18,10),                               564
     4   TYZB(21,18,10),TXYN(21,18,10),TXYS(21,18,10),                               565
     5   TXZT(21,18,10),TXZB(21,18,10),TZXE(21,18,10),                               566
     6   TZXW(21,18,10),TZYN(21,18,10),TZYS(21,18,10)                                567
C-----CALCULATE GRID TRANSFORMATION COEFFICIENTS                                     568
      DO 40 I=2,L                                                                     569
      DO 40 J=2,M                                                                     570
      DO 40 K=2,N                                                                     571
      P1=(X(I,J,K)+X(I,J-1,K)+X(I,J,K-1)+X(I,J-1,K-1)-X(I-1,J,K)-                     572
     1  X(I-1,J-1,K)-X(I-1,J,K-1)-X(I-1,J-1,K-1))*0.25                               573
      P2=(X(I,J,K)+X(I-1,J,K)+X(I,J,K-1)+X(I-1,J,K-1)-X(I,J-1,K)-                     574
     1  X(I-1,J-1,K)-X(I,J-1,K-1)-X(I-1,J-1,K-1))*0.25                               575
      P3=(X(I,J,K)+X(I-1,J,K)+X(I,J-1,K)+X(I-1,J-1,K)-X(I,J,K-1)-                     576
     1  X(I-1,J,K-1)-X(I,J-1,K-1)-X(I-1,J-1,K-1))*0.25                               577
      Q1=(Y(I,J,K)+Y(I,J-1,K)+Y(I,J,K-1)+Y(I,J-1,K-1)-Y(I-1,J,K)-                     578
     1  Y(I-1,J-1,K)-Y(I-1,J,K-1)-Y(I-1,J-1,K-1))*0.25                               579
      Q2=(Y(I,J,K)+Y(I-1,J,K)+Y(I,J,K-1)+Y(I-1,J,K-1)-Y(I,J-1,K)-                     580
     1  Y(I-1,J-1,K)-Y(I,J-1,K-1)-Y(I-1,J-1,K-1))*0.25                               581
      Q3=(Y(I,J,K)+Y(I-1,J,K)+Y(I,J-1,K)+Y(I-1,J-1,K)-Y(I,J,K-1)-                     582
     1  Y(I-1,J,K-1)-Y(I,J-1,K-1)-Y(I-1,J-1,K-1))*0.25                               583
      R1=(Z(I,J,K)+Z(I,J-1,K)+Z(I,J,K-1)+Z(I,J-1,K-1)-Z(I-1,J,K)-                     584
     1  Z(I-1,J-1,K)-Z(I-1,J,K-1)-Z(I-1,J-1,K-1))*0.25                               585
      R2=(Z(I,J,K)+Z(I-1,J,K)+Z(I,J,K-1)+Z(I-1,J,K-1)-Z(I,J-1,K)-                     586
     1  Z(I-1,J-1,K)-Z(I,J-1,K-1)-Z(I-1,J-1,K-1))*0.25                               587
      R3=(Z(I,J,K)+Z(I-1,J,K)+Z(I,J-1,K)+Z(I-1,J-1,K)-Z(I,J,K-1)-                     588
     1  Z(I-1,J,K-1)-Z(I,J-1,K-1)-Z(I-1,J-1,K-1))*0.25                               589
      PTR=1.0/(P1*(Q2*R3-Q3*R2)-P2*(Q1*R3-Q3*R1)+P3*(Q1*R2-Q2*R1))                     590
      SU(I,J,K)=ABS(1.0/PTR)                                                          591
      AE(I,J,K)=PTR*(Q2*R3-Q3*R2)                                                     592
      AW(I,J,K)=-PTR*(P2*R3-P3*R2)                                                    593
      AN(I,J,K)=PTR*(P2*Q3-P3*Q2)                                                     594
      AS(I,J,K)=-PTR*(Q1*R3-Q3*R1)                                                    595
      AT(I,J,K)=PTR*(P1*R3-P3*R1)                                                     596
```

```
000EF4I          AB(I,J,K)=-PTR*(P1*Q3-P3*Q1)                                                    597      20
000F42I          DU(I,J,K)=PTR*(Q1*R2-Q2*R1)                                                     598      21
000F88I          DV(I,J,K)=-PTR*(P1*R2-P2*R1)                                                    599      22
000FD6I          DW(I,J,K)=PTR*(P1*Q2-P2*Q1)                                                     600      23
00101CI      40  CONTINUE                                                                        601      24
001064I          CALL WALVAL(1.0,2,L,2,M,2,N,AE)                                                 602      25
0010BCI          CALL WALVAL(1.0,2,L,2,M,2,N,AW)                                                 603      26
001114I          CALL WALVAL(1.0,2,L,2,M,2,N,AN)                                                 604      27
00116CI          CALL WALVAL(1.0,2,L,2,M,2,N,AS)                                                 605      28
0011C4I          CALL WALVAL(1.0,2,L,2,M,2,N,AT)                                                 606      29
00121CI          CALL WALVAL(1.0,2,L,2,M,2,N,AB)                                                 607      30
001274I          CALL WALVAL(1.0,2,L,2,M,2,N,DU)                                                 608      31
0012CCI          CALL WALVAL(1.0,2,L,2,M,2,N,DV)                                                 609      32
001324I          CALL WALVAL(1.0,2,L,2,M,2,N,DW)                                                 610      33
00137CI          CALL WALVAL(1.0,2,L,2,M,2,N,SU)                                                 611      34
0013D4I          DO 80 I=1,L                                                                     612      35
0013E8I          DO 80 J=1,M                                                                     613      36
0013FCI          DO 80 K=1,N                                                                     614      37
001410I          CX(I,J,K)=(AE(I,J,K)+AE(I,J+1,K)+AE(I,J,K+1)+AE(I,J+1,K+1)+                     615      38
                1 AE(I+1,J,K)+AE(I+1,J+1,K)+AE(I+1,J,K+1)+AE(I+1,J+1,K+1))*0.125                 616
001594I          CY(I,J,K)=(AW(I,J,K)+AW(I,J+1,K)+AW(I,J,K+1)+AW(I,J+1,K+1)+                     617      39
                1 AW(I+1,J,K)+AW(I+1,J+1,K)+AW(I+1,J,K+1)+AW(I+1,J+1,K+1))*0.125                 618
001718I          CZ(I,J,K)=(AN(I,J,K)+AN(I,J+1,K)+AN(I,J,K+1)+AN(I,J+1,K+1)+                     619      40
                1 AN(I+1,J,K)+AN(I+1,J+1,K)+AN(I+1,J,K+1)+AN(I+1,J+1,K+1))*0.125                 620
00189CI          EX(I,J,K)=(AS(I,J,K)+AS(I,J+1,K)+AS(I,J,K+1)+AS(I,J+1,K+1)+                     621      41
                1 AS(I+1,J,K)+AS(I+1,J+1,K)+AS(I+1,J,K+1)+AS(I+1,J+1,K+1))*0.125                 622
001A20I          EY(I,J,K)=(AT(I,J,K)+AT(I,J+1,K)+AT(I,J,K+1)+AT(I,J+1,K+1)+                     623      42
                1 AT(I+1,J,K)+AT(I+1,J+1,K)+AT(I+1,J,K+1)+AT(I+1,J+1,K+1))*0.125                 624
001BA4I          EZ(I,J,K)=(AB(I,J,K)+AB(I,J+1,K)+AB(I,J,K+1)+AB(I,J+1,K+1)+                     625      43
                1 AB(I+1,J,K)+AB(I+1,J+1,K)+AB(I+1,J,K+1)+AB(I+1,J+1,K+1))*0.125                 626
001D28I          SX(I,J,K)=(DU(I,J,K)+DU(I,J+1,K)+DU(I,J,K+1)+DU(I,J+1,K+1)+                     627      44
                1 DU(I+1,J,K)+DU(I+1,J+1,K)+DU(I+1,J,K+1)+DU(I+1,J+1,K+1))*0.125                 628
001EACI          SY(I,J,K)=(DV(I,J,K)+DV(I,J+1,K)+DV(I,J,K+1)+DV(I,J+1,K+1)+                     629      45
                1 DV(I+1,J,K)+DV(I+1,J+1,K)+DV(I+1,J,K+1)+DV(I+1,J+1,K+1))*0.125                 630
002030I          SZ(I,J,K)=(DW(I,J,K)+DW(I,J+1,K)+DW(I,J,K+1)+DW(I,J+1,K+1)+                     631      46
                1 DW(I+1,J,K)+DW(I+1,J+1,K)+DW(I+1,J,K+1)+DW(I+1,J+1,K+1))*0.125                 632
002194I          TJO(I,J,K)=(SU(I,J,K)+SU(I,J+1,K)+SU(I,J,K+1)+SU(I,J+1,K+1)+                    633      47
                1 SU(I+1,J,K)+SU(I+1,J+1,K)+SU(I+1,J,K+1)+SU(I+1,J+1,K+1))*0.125                 634
002338I      80  CONTINUE                                                                        635      48
002380I          DO 200 I=1,LO                                                                   636      49
002394I          DO 200 J=1,MO                                                                   637      50
0023A8I          DO 200 K=1,NO                                                                   638      51
0023BCI          DU(I,J,K)=0.0                                                                   639      52
0023E8I     200  CONTINUE                                                                        640      53
002430I          DO 160 I=2,LT                                                                   641      54
002444I          DO 160 J=2,MT                                                                   642      55
002458I          DO 160 K=2,NT                                                                   643      56
00246CI          CXE=(CX(I+1,J,K)+CX(I,J,K))*0.5                                                 644      57
0024C8I          CXW=(CX(I-1,J,K)+CX(I,J,K))*0.5                                                 645      58
002524I          CXN=(CX(I,J+1,K)+CX(I,J,K))*0.5                                                 646      59
002580I          CXS=(CX(I,J,K)+CX(I,J-1,K))*0.5                                                 647      60
0025DCI          CXT=(CX(I,J,K+1)+CX(I,J,K))*0.5                                                 648      61
002636I          CXB=(CX(I,J,K)+CX(I,J,K-1))*0.5                                                 649      62
002690I          CYE=(CY(I+1,J,K)+CY(I,J,K))*0.5                                                 650      63
0026ECI          CYW=(CY(I,J,K)+CY(I-1,J,K))*0.5                                                 651      64
002748I          CYN=(CY(I,J+1,K)+CY(I,J,K))*0.5                                                 652      65
0027A4I          CYS=(CY(I,J,K)+CY(I,J-1,K))*0.5                                                 653      66
```

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115  002800I        CYT=(CY(I,J,K+1)+CY(I,J,K))*0.5                                                    654   67
116  00285AI        CYB=(CY(I,J,K)+CY(I,J,K-1))*0.5                                                    655   68
117  0028B4I        CZE=(CZ(I+1,J,K)+CZ(I,J,K))*0.5                                                    656   69
118  002910I        CZW=(CZ(I,J,K)+CZ(I-1,J,K))*0.5                                                    657   70
119  00296CI        CZN=(CZ(I,J+1,K)+CZ(I,J,K))*0.5                                                    658   71
120  0029C8I        CZS=(CZ(I,J,K)+CZ(I,J-1,K))*0.5                                                    659   72
121  002A24I        CZT=(CZ(I,J,K+1)+CZ(I,J,K))*0.5                                                    660   73
122  002A7EI        CZB=(CZ(I,J,K)+CZ(I,J,K-1))*0.5                                                    661   74
123  002AD8I        EXE=(EX(I+1,J,K)+EX(I,J,K))*0.5                                                    662   75
124  002B34I        EXW=(EX(I,J,K)+EX(I-1,J,K))*0.5                                                    663   76
125  002B90I        EXN=(EX(I,J+1,K)+EX(I,J,K))*0.5                                                    664   77
126  002BECI        EXS=(EX(I,J,K)+EX(I,J-1,K))*0.5                                                    665   78
127  002C48I        EXT=(EX(I,J,K+1)+EX(I,J,K))*0.5                                                    666   79
128  002CA2I        EXB=(EX(I,J,K)+EX(I,J,K-1))*0.5                                                    667   80
129  002CFCI        EYE=(EY(I+1,J,K)+EY(I,J,K))*0.5                                                    668   81
130  002D58I        EYW=(EY(I,J,K)+EY(I-1,J,K))*0.5                                                    669   82
131  002DB4I        EYN=(EY(I,J+1,K)+EY(I,J,K))*0.5                                                    670   83
132  002E10I        EYS=(EY(I,J,K)+EY(I,J-1,K))*0.5                                                    671   84
133  002E6CI        EYT=(EY(I,J,K+1)+EY(I,J,K))*0.5                                                    672   85
134  002EC6I        EYB=(EY(I,J,K)+EY(I,J,K-1))*0.5                                                    673   86
135  002F20I        EZE=(EZ(I+1,J,K)+EZ(I,J,K))*0.5                                                    674   87
136  002F7CI        EZW=(EZ(I,J,K)+EZ(I-1,J,K))*0.5                                                    675   88
137  002FD8I        EZN=(EZ(I,J+1,K)+EZ(I,J,K))*0.5                                                    676   89
138  003034I        EZS=(EZ(I,J,K)+EZ(I,J-1,K))*0.5                                                    677   90
139  003090I        EZT=(EZ(I,J,K+1)+EZ(I,J,K))*0.5                                                    678   91
140  0030EAI        EZB=(EZ(I,J,K)+EZ(I,J,K-1))*0.5                                                    679   92
141  003144I        SXE=(SX(I+1,J,K)+SX(I,J,K))*0.5                                                    680   93
142  0031A0I        SXW=(SX(I,J,K)+SX(I-1,J,K))*0.5                                                    681   94
143  0031FCI        SXN=(SX(I,J+1,K)+SX(I,J,K))*0.5                                                    682   95
144  003258I        SXS=(SX(I,J,K)+SX(I,J-1,K))*0.5                                                    683   96
145  0032B4I        SXT=(SX(I,J,K+1)+SX(I,J,K))*0.5                                                    684   97
146  003310I        SXB=(SX(I,J,K)+SX(I,J,K-1))*0.5                                                    685   98
147  003368I        SYE=(SY(I+1,J,K)+SY(I,J,K))*0.5                                                    686   99
148  0033C4I        SYW=(SY(I,J,K)+SY(I-1,J,K))*0.5                                                    687  100
149  003420I        SYN=(SY(I,J+1,K)+SY(I,J,K))*0.5                                                    688  101
150  00347CI        SYS=(SY(I,J,K)+SY(I,J-1,K))*0.5                                                    689  102
151  0034D8I        SYT=(SY(I,J,K+1)+SY(I,J,K))*0.5                                                    690  103
152  003532I        SYB=(SY(I,J,K)+SY(I,J,K-1))*0.5                                                    691  104
153  00358CI        SZE=(SZ(I+1,J,K)+SZ(I,J,K))*0.5                                                    692  105
154  0035E8I        SZW=(SZ(I,J,K)+SZ(I-1,J,K))*0.5                                                    693  106
155  003644I        SZN=(SZ(I,J+1,K)+SZ(I,J,K))*0.5                                                    694  107
156  0036A0I        SZS=(SZ(I,J,K)+SZ(I,J-1,K))*0.5                                                    695  108
157  0036FCI        SZT=(SZ(I,J,K+1)+SZ(I,J,K))*0.5                                                    696  109
158  003756I        SZB=(SZ(I,J,K)+SZ(I,J,K-1))*0.5                                                    697  110
159  0037B0I        TXXE(I,J,K)=CXE*CX(I,J,K)+CYE*CY(I,J,K)+CZE*CZ(I,J,K)                              698  111
160  00385EI        TXXW(I,J,K)=CXW*CX(I,J,K)+CYW*CY(I,J,K)+CZW*CZ(I,J,K)                              699  112
161  00390CI        TYYN(I,J,K)=EXN*EX(I,J,K)+EYN*EY(I,J,K)+EZN*EZ(I,J,K)                              700  113
162  0039BAI        TYYS(I,J,K)=EXS*EX(I,J,K)+EYS*EY(I,J,K)+EZS*EZ(I,J,K)                              701  114
163  003A68I        TZZT(I,J,K)=SXT*SX(I,J,K)+SYT*SY(I,J,K)+SZT*SZ(I,J,K)                              702  115
164  003B16I        TZZB(I,J,K)=SXB*SX(I,J,K)+SYB*SY(I,J,K)+SZB*SZ(I,J,K)                              703  116
165  003BC4I        TYXE(I,J,K)=(EXE*CX(I,J,K)+EYE*CY(I,J,K)+EZE*CZ(I,J,K))*0.25                       704  117
166  003C78I        TYXW(I,J,K)=(EXW*CX(I,J,K)+EYW*CY(I,J,K)+EZW*CZ(I,J,K))*0.25                       705  118
167  003D2CI        TYZT(I,J,K)=(EXT*SX(I,J,K)+EYT*SY(I,J,K)+EZT*SZ(I,J,K))*0.25                       706  119
168  003DE0I        TYZB(I,J,K)=(EXB*SX(I,J,K)+EYB*SY(I,J,K)+EZB*SZ(I,J,K))*0.25                       707  120
169  003E94I        TXYN(I,J,K)=(CXN*EX(I,J,K)+CYN*EY(I,J,K)+CZN*EZ(I,J,K))*0.25                       708  121
170  003F48I        TXYS(I,J,K)=(CXS*EX(I,J,K)+CYS*EY(I,J,K)+CZS*EZ(I,J,K))*0.25                       709  122
171  003FFCI        TXZT(I,J,K)=(CXT*SX(I,J,K)+CYT*SY(I,J,K)+CZT*SZ(I,J,K))*0.25                       710  123
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172  0040B0I          TXZB(I,J,K)=(CXB*SX(I,J,K)+CYB*SY(I,J,K)+CZB*SZ(I,J,K))*0.25                711     124
173  004164I          TZXE(I,J,K)=(SXE*CX(I,J,K)+SYE*CY(I,J,K)+SZE*CZ(I,J,K))*0.25                712     125
174  004218I          TZXW(I,J,K)=(SXW*CX(I,J,K)+SYW*CY(I,J,K)+SZW*CZ(I,J,K))*0.25                713     126
175  0042CCI          TZYN(I,J,K)=(SXN*EX(I,J,K)+SYN*EY(I,J,K)+SZN*EZ(I,J,K))*0.25                714     127
176  004380I          TZYS(I,J,K)=(SXS*EX(I,J,K)+SYS*EY(I,J,K)+SZS*EZ(I,J,K))*0.25                715     128
177  004434I    160   CONTINUE                                                                    716     129
178  00447CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXXE)                                        717     130
179  0044D4I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXXW)                                        718     131
180  00452CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYYN)                                        719     132
181  004584I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYYS)                                        720     133
182  0045DCI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZZT)                                        721     134
183  004634I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZZB)                                        722     135
184  00468CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYXE)                                        723     136
185  0046E4I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYXW)                                        724     137
186  00473CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYZT)                                        725     138
187  004794I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TYZB)                                        726     139
188  0047ECI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXYN)                                        727     140
189  004844I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXYS)                                        728     141
190  00489CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXZT)                                        729     142
191  0048F4I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TXZB)                                        730     143
192  00494CI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZXE)                                        731     144
193  0049A4I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZXW)                                        732     145
194  0049FCI          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZYN)                                        733     146
195  004A54I          CALL WALVAL(1.0,2,LT,2,MT,2,NT,TZYS)                                        734     147
196  004AACI          RETURN                                                                      735     148
197  004A94I          END                                                                         736     149

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  TRANF     02/21/86  09:50:44  TABLE SPACE:  10 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 199 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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000000I          SUBROUTINE INIT
000004I          COMMON
                1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),
                2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,
                3  PP(21,18,10),W(21,18,10),TM(21,18,10)
                1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN
                1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)
000004I          COMMON
                1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,
                2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT
          C-----INITIALIZE VARIABLES
000004I          DO 10 I=1,LO
000018I          DO 10 J=1,MO
00002CI          DO 10 K=1,NO
000040I          U(I,J,K)=0.0
00006CI          V(I,J,K)=0.0
000098I          W(I,J,K)=0.0
0000C4I          P(I,J,K)=0.0
0000F0I          PP(I,J,K)=0.0
00011CI          DK(I,J,K)=0.0
000148I          DE(I,J,K)=0.0
000174I          DEN(I,J,K)=DENIN
0001A0I          VISE(I,J,K)=VISC
0001CCI       10 CONTINUE
000214I          RETURN
00021AI          END
```

```
NO  ERRORS:F70  R05-01.00  SUBROUTINE  INIT      02/21/86  09:51:07  TABLE SPACE:   3 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 126 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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```
  1  000000I          SUBROUTINE NEWVIS                                                  763
  2  000004I          COMMON                                                             764
  3                  1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),            765
  4                  2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,                    766
  5                  3  PP(21,18,10),W(21,18,10),TM(21,18,10)                          767
  6                  1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN             768
  7                  1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)                     769
  8                  1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),   770
  9                  2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),        771
 10                  3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),        772
 11                  4 TALW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO         773
 12  000004I          COMMON                                                             774
 13                  1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,      775
 14                  2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT    776
 15                C-----EVALUATE TURBULENT VISCOSITY                                   777
 16  000004I          DO 10 I=1,L                                                        778        1
 17  000018I          DO 10 J=1,M                                                        779        2
 18  00002CI          DO 10 K=1,N                                                        780        3
 19  000040I          IF(DK(I,J,K) .LE. SMNUM) DK(I,J,K)=SMNUM                           781        4
 20  00009EI          IF(DE(I,J,K) .LE. SMNUM) DE(I,J,K)=SMNUM                           782        6
 21  0000FCI          IF(DE(I,J,K) .LE. SMNUM) GO TO 12      -                           783        8
 22  000134I          TURVIS=DEN(I,J,K)*CMU*DK(I,J,K)**2/DE(I,J,K)+VISC                  784       10
 23  0001C2I          GO TO 14                                                           785       11
 24  0001C8I     12   TURVIS=VISC                                                        786       12
 25  0001D4I     14   CONTINUE                                                           787       13
 26  0001D4I          VISE(I,J,K)=VISE(I,J,K)+ALVIS*(TURVIS-VISE(I,J,K))                 788       14
 27  000252I     10   CONTINUE                                                           789       15
 28  00029AI          RETURN                                                             790       16
 29  0002A0I          END                                                                791       17

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  NEWVIS    02/21/86  09:51:23  TABLE SPACE:   5 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 203 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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```
      SUBROUTINE SOLVEQ(IE,ISWF,ALF,SIGF,ERRF,F,F0)                                  792
      DIMENSION F(21,18,10),F1(21,18,10),F0(21,18,10)                                793
      COMMON                                                                         794
     1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),QK(21,18,10),                         795
     2  QE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,                                  796
     3  PP(21,18,10),W(21,18,10),TM(21,18,10)                                        797
     1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN                         798
     1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)                                 799
     1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),                800
     2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),                    801
     3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),                    802
     4 TAUW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO                     803
     1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),                  804
     2   SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),                      805
     3   AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)                       806
      COMMON                                                                         807
     1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),                     808
     2   CX(21,18,10),CY(21,18,10),CZ(21,18,10),                                    809
     3   EX(21,18,10),EY(21,18,10),EZ(21,18,10),                                    810
     3   SX(21,18,10),SY(21,18,10),SZ(21,18,10)                                     811
     1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,                   812
     2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT                813
      COMMON                                                                         814
     1/TTRAN/TXXE(21,18,10),TXXW(21,18,10),TYYN(21,18,10),                          815
     2   TYYS(21,18,10),TZZT(21,18,10),TZZB(21,18,10),                              816
     3   TYXE(21,18,10),TYXW(21,18,10),TYZT(21,18,10),                              817
     4   TYZB(21,18,10),TXYN(21,18,10),TXYS(21,18,10),                              818
     5   TXZT(21,18,10),TXZB(21,18,10),TZXE(21,18,10),                              819
     6   TZXW(21,18,10),TZYN(21,18,10),TZYS(21,18,10)                               820
C------TRANSPORT EQUATIONS LINERAIZATION AND SOLVER                                 821
      ERRF=0.0                                                                       822        1
      PI=3.141592654                                                                 823        2
C-----PRESSURE CORRECTION SOLVER STARTS FROM 10                                      824
      IF(IE .EQ. 0) GO TO 10                                                         825        3
C-----U, V, W, TM, K & E EQUATIONS                                                  826
      IS=2                                                                           827        5
      IT=LT                                                                          828        6
      JS=2                                                                           829        7
      JT=MT                                                                          830        8
      KS=2                                                                           831        9
      KT=NT                                                                          832       10
      GO TO (21,29,29,29,29,21,21,21), IE                                            833       11
   21 CONTINUE                                                                       834       12
      DO 22 I=IS,IT                                                                  835       13
      DO 22 J=JS,JT                                                                  836       14
      DO 22 K=KS,KT                                                                  837       15
   22 F1(I,J,K)=VISE(I,J,K)/SIGF                                                     838       16
C-----EVALUATE LINK COEFF. AND SOURCE TERMS                                         839
      DO 20 I=IS,IT                                                                  840       17
      DO 20 J=JS,JT                                                                  841       18
      DO 20 K=KS,KT                                                                  842       19
      GAE=0.5*(F1(I+1,J,K)+F1(I,J,K))                                                843       20
      GAW=0.5*(F1(I-1,J,K)+F1(I,J,K))                                                844       21
      GAN=0.5*(F1(I,J+1,K)+F1(I,J,K))                                                845       22
      GAS=0.5*(F1(I,J-1,K)+F1(I,J,K))                                                846       23
      GAT=0.5*(F1(I,J,K+1)+F1(I,J,K))                                                847       24
      GAB=0.5*(F1(I,J,K-1)+F1(I,J,K))                                                848       25
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 58  003F18I          DENE=0.5*(DEN(I+1,J,K)+DEN(I,J,K))                                  849      26
 59  003F74I          DENW=0.5*(DEN(I-1,J,K)+DEN(I,J,K))                                  850      27
 60  003FD0I          DENN=0.5*(DEN(I,J+1,K)+DEN(I,J,K))                                  851      28
 61  00402CI          DENS=0.5*(DEN(I,J-1,K)+DEN(I,J,K))                                  852      29
 62  004088I          DENT=0.5*(DEN(I,J,K+1)+DEN(I,J,K))                                  853      30
 63  0040E2I          DENB=0.5*(DEN(I,J,K-1)+DEN(I,J,K))                                  854      31
 64  00413CI          UE=C.5*(U(I+1,J,K)+U(I,J,K))                                        855      32
 65  004198I          UW=C.5*(U(I-1,J,K)+U(I,J,K))                                        856      33
 66  0041F4I          UN=C.5*(U(I,J+1,K)+U(I,J,K))                                        857      34
 67  004250I          US=C.5*(U(I,J-1,K)+U(I,J,K))                                        858      35
 68  0042ACI          UT=C.5*(U(I,J,K+1)+U(I,J,K))                                        859      36
 69  004306I          UB=0.5*(U(I,J,K-1)+U(I,J,K))                                        860      37
 70  004360I          VE=0.5*(V(I+1,J,K)+V(I,J,K))                                        861      38
 71  00433CI          VW=C.5*(V(I-1,J,K)+V(I,J,K))                                        862      39
 72  004418I          VN=C.5*(V(I,J+1,K)+V(I,J,K))                                        863      40
 73  004474I          VS=C.5*(V(I,J-1,K)+V(I,J,K))                                        864      41
 74  0044D0I          VT=C.5*(V(I,J,K+1)+V(I,J,K))                                        865      42
 75  00452AI          VB=C.5*(V(I,J,K-1)+V(I,J,K))                                        866      43
 76  004584I          WE=C.5*(W(I+1,J,K)+W(I,J,K))                                        867      44
 77  0045E0I          WW=C.5*(W(I-1,J,K)+W(I,J,K))                                        868      45
 78  00463CI          WN=C.5*(W(I,J+1,K)+W(I,J,K))                                        869      46
 79  004698I          WS=C.5*(W(I,J-1,K)+W(I,J,K))                                        870      47
 80  0046F4I          WT=C.5*(W(I,J,K+1)+W(I,J,K))                                        871      48
 81  00474EI          WB=C.5*(W(I,J,K-1)+W(I,J,K))                                        872      49
 82  0047A8I          CE=DENE*(UE*CX(I,J,K)+VE*CY(I,J,K)+WE*CZ(I,J,K))                    873      50
 83  00483CI          CW=DENW*(UW*CX(I,J,K)+VW*CY(I,J,K)+WW*CZ(I,J,K))                    874      51
 84  0048D0I          CN=DENN*(UN*EX(I,J,K)+VN*EY(I,J,K)+WN*EZ(I,J,K))                    875      52
 85  004964I          CS=DENS*(US*EX(I,J,K)+VS*EY(I,J,K)+WS*EZ(I,J,K))                    876      53
 86  0049F8I          CT=DENT*(UT*SX(I,J,K)+VT*SY(I,J,K)+WT*SZ(I,J,K))                    877      54
 87  004A8CI          CB=DENB*(UB*SX(I,J,K)+VB*SY(I,J,K)+WB*SZ(I,J,K))                    878      55
 88  004B20I          DDE=GAE*TXXE(I,J,K)+GAN*TXYN(I,J,K)-GAS*TXYS(I,J,K)+                879      56
 89                  1     GAT*TXZT(I,J,K)-GAB*TXZB(I,J,K)                               880
 90  004C0AI          DDW=GAW*TXXW(I,J,K)+GAS*TXYS(I,J,K)-GAN*TXYN(I,J,K)-                881      57
 91                  1     GAT*TXZT(I,J,K)+GAB*TXZB(I,J,K)                               882
 92  004CF4I          DDN=GAN*TYYN(I,J,K)+GAE*TYXE(I,J,K)-GAW*TYXW(I,J,K)+                883      58
 93                  1     GAT*TYZT(I,J,K)-GAB*TYZB(I,J,K)                               884
 94  004DDEI          DDS=GAS*TYYS(I,J,K)+GAW*TYXW(I,J,K)-GAE*TYXE(I,J,K)-                885      59
 95                  1     GAT*TYZT(I,J,K)+GAB*TYZB(I,J,K)                               886
 96  004EC8I          DDT=GAT*TZZT(I,J,K)+GAE*TZXE(I,J,K)-GAW*TZXW(I,J,K)+                887      60
 97                  1     GAN*TZYN(I,J,K)-GAS*TZYS(I,J,K)                               888
 98  004F82I          DDB=GAB*TZZB(I,J,K)+GAW*TZXW(I,J,K)-GAE*TZXE(I,J,K)-                889      61
 99                  1     GAN*TZYN(I,J,K)+GAS*TZYS(I,J,K)                               890
100  00509CI          CPO=ABS(CE-CW+CN-CS+CT-CB)                                          891      62
101  005032I          AE(I,J,K)=(AMAX1(ABS(0.5*CE),DDE)-0.5*CE)*TJO(I,J,K)                892      63
102  005186I          AW(I,J,K)=(AMAX1(ABS(0.5*CW),DDW)+0.5*CW)*TJO(I,J,K)                893      64
103  00522AI          AN(I,J,K)=(AMAX1(ABS(0.5*CN),DDN)-0.5*CN)*TJO(I,J,K)                894      65
104  0052CEI          AS(I,J,K)=(AMAX1(ABS(0.5*CS),DDS)+0.5*CS)*TJO(I,J,K)                895      66
105  005372I          AT(I,J,K)=(AMAX1(ABS(0.5*CT),DDT)-0.5*CT)*TJO(I,J,K)                896      67
106  005416I          AB(I,J,K)=(AMAX1(ABS(0.5*CB),DDB)+0.5*CB)*TJO(I,J,K)                897      68
107  00548AI          DDNE=GAE*TYXE(I,J,K)+GAN*TXYN(I,J,K)                                898      69
108  00551AI          DDSE=-GAE*TYXE(I,J,K)-GAS*TXYS(I,J,K)                               899      70
109  005582I          DDNW=-GAW*TYXW(I,J,K)-GAN*TXYN(I,J,K)                               900      71
110  0055EAI          DDSW=GAW*TYXW(I,J,K)+GAS*TXYS(I,J,K)                                901      72
111  00564AI          DDET=GAE*TZXE(I,J,K)+GAT*TXZT(I,J,K)                                902      73
112  0056AAI          DDEB=-GAE*TZXE(I,J,K)-GAB*TXZB(I,J,K)                               903      74
113  005712I          DDWT=-GAW*TZXW(I,J,K)-GAT*TXZT(I,J,K)                               904      75
114  00577AI          DDWB=GAW*TZXW(I,J,K)+GAB*TXZB(I,J,K)                                905      76
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      DONT=GAN*TZYN(I,J,K)+GAT*TYZT(I,J,K)                                  906    77
      DONB=-GAN*TZYN(I,J,K)-GAB*TYZB(I,J,K)                                 907    78
      DOST=-GAS*TZYS(I,J,K)-GAT*TYZT(I,J,K)                                 908    79
      DOSB=GAS*TZYS(I,J,K)+GAB*TYZB(I,J,K)                                  909    80
      SU(I,J,K)=CPO*F(I,J,K)+DONE*F(I+1,J+1,K)+DOSE*F(I+1,J-1,K)+           910    81
     1          DONW*F(I-1,J+1,K)+DOSW*F(I-1,J-1,K)+                        911
     2          DOET*F(I+1,J,K+1)+DOEB*F(I+1,J,K-1)+                        912
     3          DOWT*F(I-1,J,K+1)+DOWB*F(I-1,J,K-1)+                        913
     4          DONT*F(I,J+1,K+1)+DONB*F(I,J+1,K-1)+                        914
     5          DOST*F(I,J-1,K+1)+DOSB*F(I,J-1,K-1)                         915
      SV(I,J,K)=CPO*V(I,J,K)+DONE*V(I+1,J+1,K)+DOSE*V(I+1,J-1,K)+           916    82
     1          DONW*V(I-1,J+1,K)+DOSW*V(I-1,J-1,K)+                        917
     2          DOET*V(I+1,J,K+1)+DOEB*V(I+1,J,K-1)+                        918
     3          DOWT*V(I-1,J,K+1)+DOWB*V(I-1,J,K-1)+                        919
     4          DONT*V(I,J+1,K+1)+DONB*V(I,J+1,K-1)+                        920
     5          DOST*V(I,J-1,K+1)+DOSB*V(I,J-1,K-1)                         921
      SW(I,J,K)=CPO*W(I,J,K)+DONE*W(I+1,J+1,K)+DOSE*W(I+1,J-1,K)+           922    83
     1          DONW*W(I-1,J+1,K)+DOSW*W(I-1,J-1,K)+                        923
     2          DOET*W(I+1,J,K+1)+DOEB*W(I+1,J,K-1)+                        924
     3          DOWT*W(I-1,J,K+1)+DOWB*W(I-1,J,K-1)+                        925
     4          DONT*W(I,J+1,K+1)+DONB*W(I,J+1,K-1)+                        926
     5          DOST*W(I,J-1,K+1)+DOSB*W(I,J-1,K-1)                         927
      PP(I,J,K)=CPO*DK(I,J,K)+DONE*DK(I+1,J+1,K)+DOSE*DK(I+1,J-1,K)+        928    84
     1          DONW*DK(I-1,J+1,K)+DOSW*DK(I-1,J-1,K)+                      929
     2          DOET*DK(I+1,J,K+1)+DOEB*DK(I+1,J,K-1)+                      930
     3          DOWT*DK(I-1,J,K+1)+DOWB*DK(I-1,J,K-1)+                      931
     4          DONT*DK(I,J+1,K+1)+DONB*DK(I,J+1,K-1)+                      932
     5          DOST*DK(I,J-1,K+1)+DOSB*DK(I,J-1,K-1)                       933
      SUK(I,J,K)=CPO                                                        934    85
      SPK(I,J,K)=-CPO-APC(I,J,K)                                            935    86
      UCXI=UE-UW                                                            936    87
      UEDA=UN-US                                                            937    88
      USCI=UT-UB                                                            938    89
      VCXI=VE-VW                                                            939    90
      VEDA=VN-VS                                                            940    91
      VSCI=VT-VB                                                            941    92
      WCXI=WE-WW                                                            942    93
      WEDA=WN-WS                                                            943    94
      WSCI=WT-WB                                                            944    95
      UX=UCXI*CX(I,J,K)+UEDA*EX(I,J,K)+USCI*SX(I,J,K)                       945    96
      UY=UCXI*CY(I,J,K)+UEDA*EY(I,J,K)+USCI*SY(I,J,K)                       946    97
      UZ=UCXI*CZ(I,J,K)+UEDA*EZ(I,J,K)+USCI*SZ(I,J,K)                       947    98
      VX=VCXI*CX(I,J,K)+VEDA*EX(I,J,K)+VSCI*SX(I,J,K)                       948    99
      VY=VCXI*CY(I,J,K)+VEDA*EY(I,J,K)+VSCI*SY(I,J,K)                       949   100
      VZ=VCXI*CZ(I,J,K)+VEDA*EZ(I,J,K)+VSCI*SZ(I,J,K)                       950   101
      WX=WCXI*CX(I,J,K)+WEDA*EX(I,J,K)+WSCI*SX(I,J,K)                       951   102
      WY=WCXI*CY(I,J,K)+WEDA*EY(I,J,K)+WSCI*SY(I,J,K)                       952   103
      WZ=WCXI*CZ(I,J,K)+WEDA*EZ(I,J,K)+WSCI*SZ(I,J,K)                       953   104
      GEN(I,J,K)=VISE(I,J,K)*((UY+VX)**2+(VZ+WY)**2+(WX+UZ)**2+             954   105
     1          2*(UX*UX+VY*VY+WZ*WZ))                                      955
   20 CONTINUE                                                              956   106
C-------------------------------------------------------------------------  957
   29 CONTINUE                                                              958   107
C-----CALCULATE SOURCE TERMS                                               959
      GO TO (1,2,3,4,5,6,7), IE                                             960   108
C-----U-, V-, W-SOURCES                                                    961
    1 CONTINUE                                                              962   109
```

```
172  006C66I          DO 15 I=IS,IT                                                  963     110
173  006C7EI          DO 15 J=JS,JT                                                  964     111
174  006C96I          DO 15 K=KS,KT                                                  965     112
175  006CAEI          GAE=0.5*(F1(I+1,J,K)+F1(I,J,K))                                966     113
176  006D0AI          GAW=0.5*(F1(I-1,J,K)+F1(I,J,K))                                967     114
177  006D66I          GAN=0.5*(F1(I,J+1,K)+F1(I,J,K))                                968     115
178  006DC2I          GAS=0.5*(F1(I,J-1,K)+F1(I,J,K))                                969     116
179  006E1EI          GAT=0.5*(F1(I,J,K+1)+F1(I,J,K))                                970     117
180  006E78I          GAB=0.5*(F1(I,J,K-1)+F1(I,J,K))                                971     118
181  006ED2I          PCXI=(P(I+1,J,K)+P(I+1,J+1,K)+P(I+1,J,K+1)+P(I+1,J+1,K+1)-     972     119
182                  1       P(I,J,K)-P(I,J+1,K)-P(I,J,K+1)-P(I,J+1,K+1))*0.25       973
183  007036I          PEDA=(P(I,J+1,K)+P(I+1,J+1,K)+P(I,J+1,K+1)+P(I+1,J+1,K+1)-     974     120
184                  1       P(I,J,K)-P(I+1,J,K)-P(I,J,K+1)-P(I+1,J,K+1))*0.25       975
185  00719AI          PSCI=(P(I,J,K+1)+P(I+1,J,K+1)+P(I,J+1,K+1)+P(I+1,J+1,K+1)-     976     121
186                  1       P(I,J,K)-P(I+1,J,K)-P(I,J+1,K)-P(I+1,J+1,K))*0.25       977
187  0072FEI          UCE=U(I+1,J,K)-U(I,J,K)                                        978     122
188  007354I          UCW=U(I,J,K)-U(I-1,J,K)                                        979     123
189  0073AAI          UCN=(U(I+1,J+1,K)+U(I+1,J,K)-U(I-1,J+1,K)-U(I-1,J,K))*0.25     980     124
190  007406I          UCS=(U(I+1,J,K)+U(I+1,J-1,K)-U(I-1,J,K)-U(I-1,J-1,K))*0.25     981     125
191  007522I          UCT=(U(I+1,J,K+1)+U(I+1,J,K)-U(I-1,J,K+1)-U(I-1,J,K))*0.25     982     126
192  007D0AI          UCB=(U(I+1,J,K)+U(I+1,J,K-1)-U(I-1,J,K)-U(I-1,J,K-1))*0.25     983     127
193  007692I          UEE=(U(I+1,J+1,K)+U(I,J+1,K)-U(I+1,J-1,K)-U(I,J-1,K))*0.25     984     128
194  00774EI          UEW=(U(I,J+1,K)+U(I-1,J+1,K)-U(I,J-1,K)-U(I-1,J-1,K))*0.25     985     129
195  007B0AI          UEN=U(I,J+1,K)-U(I,J,K)                                        986     130
196  007B60I          UES=U(I,J,K)-U(I,J-1,K)                                        987     131
197  007B86I          UET=(U(I,J+1,K+1)+U(I,J+1,K)-U(I,J-1,K+1)-U(I,J-1,K))*0.25     988     132
198  007B6EI          UEB=(U(I,J+1,K)+U(I,J+1,K-1)-U(I,J-1,K)-U(I,J-1,K-1))*0.25     989     133
199  007A26I          USE=(U(I+1,J,K+1)+U(I,J,K+1)-U(I+1,J,K-1)-U(I,J,K-1))*0.25     990     134
200  007ADAI          USW=(U(I,J,K+1)+U(I-1,J,K+1)-U(I,J,K-1)-U(I-1,J,K-1))*0.25     991     135
201  007B3EI          USN=(U(I,J+1,K+1)+U(I,J,K+1)-U(I,J+1,K-1)-U(I,J,K-1))*0.25     992     136
202  007C42I          USS=(U(I,J,K+1)+U(I,J-1,K+1)-U(I,J,K-1)-U(I,J-1,K-1))*0.25     993     137
203  007CF6I          UST=U(I,J,K+1)-U(I,J,K)                                        994     138
204  007D4AI          USB=U(I,J,K)-U(I,J,K-1)                                        995     139
205  007D9EI          VCE=V(I+1,J,K)-V(I,J,K)                                        996     140
206  007DF4I          VCW=V(I,J,K)-V(I-1,J,K)                                        997     141
207  007E4AI          VCN=(V(I+1,J+1,K)+V(I+1,J,K)-V(I-1,J+1,K)-V(I-1,J,K))*0.25     998     142
208  007F06I          VCS=(V(I+1,J,K)+V(I+1,J-1,K)-V(I-1,J,K)-V(I-1,J-1,K))*0.25     999     143
209  007FC2I          VCT=(V(I+1,J,K+1)+V(I+1,J,K)-V(I-1,J,K+1)-V(I-1,J,K))*0.25     1000    144
210  00807AI          VCB=(V(I+1,J,K)+V(I+1,J,K-1)-V(I-1,J,K)-V(I-1,J,K-1))*0.25     1001    145
211  008132I          VEE=(V(I+1,J+1,K)+V(I,J+1,K)-V(I+1,J-1,K)-V(I,J-1,K))*0.25     1002    146
212  0081EEI          VEW=(V(I,J+1,K)+V(I-1,J+1,K)-V(I,J-1,K)-V(I-1,J-1,K))*0.25     1003    147
213  0082AAI          VEN=V(I,J+1,K)-V(I,J,K)                                        1004    148
214  008300I          VES=V(I,J,K)-V(I,J-1,K)                                        1005    149
215  008356I          VET=(V(I,J+1,K+1)+V(I,J+1,K)-V(I,J-1,K+1)-V(I,J-1,K))*0.25     1006    150
216  00840EI          VEB=(V(I,J+1,K)+V(I,J+1,K-1)-V(I,J-1,K)-V(I,J-1,K-1))*0.25     1007    151
217  0084C6I          VSE=(V(I+1,J,K+1)+V(I,J,K+1)-V(I+1,J,K-1)-V(I,J,K-1))*0.25     1008    152
218  00857AI          VSW=(V(I,J,K+1)+V(I-1,J,K+1)-V(I,J,K-1)-V(I-1,J,K-1))*0.25     1009    153
219  00862EI          VSN=(V(I,J+1,K+1)+V(I,J,K+1)-V(I,J+1,K-1)-V(I,J,K-1))*0.25     1010    154
220  0086E2I          VSS=(V(I,J,K+1)+V(I,J-1,K+1)-V(I,J,K-1)-V(I,J-1,K-1))*0.25     1011    155
221  008796I          VST=V(I,J,K+1)-V(I,J,K)                                        1012    156
222  0087EAI          VSB=V(I,J,K)-V(I,J,K-1)                                        1013    157
223  00883EI          WCE=W(I+1,J,K)-W(I,J,K)                                        1014    158
224  008894I          WCW=W(I,J,K)-W(I-1,J,K)                                        1015    159
225  0088EAI          WCN=(W(I+1,J+1,K)+W(I+1,J,K)-W(I-1,J+1,K)-W(I-1,J,K))*0.25     1016    160
226  0089A6I          WCS=(W(I+1,J,K)+W(I+1,J-1,K)-W(I-1,J,K)-W(I-1,J-1,K))*0.25     1017    161
227  008A62I          WCT=(W(I+1,J,K+1)+W(I+1,J,K)-W(I-1,J,K+1)-W(I-1,J,K))*0.25     1018    162
228  008B1AI          WCB=(W(I+1,J,K)+W(I+1,J,K-1)-W(I-1,J,K)-W(I-1,J,K-1))*0.25     1019    163
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229  0086D2I        WEE=(W(I+1,J+1,K)+W(I,J+1,K)-W(I+1,J-1,K)-W(I,J-1,K))*0.25                    1020    164
230  0086E8I        WEW=(W(I,J+1,K)+W(I-1,J+1,K)-W(I,J-1,K)-W(I-1,J-1,K))*0.25                   1021    165
231  0086D4AI       WEN=W(I,J+1,K)-W(I,J,K)                                                      1022    166
232  0086DA0I       WES=W(I,J,K)-W(I,J-1,K)                                                      1023    167
233  0086DF6I       WET=(W(I,J+1,K+1)+W(I,J+1,K)-W(I,J-1,K+1)-W(I,J-1,K))*0.25                   1024    168
234  0086EAEI       WEB=(W(I,J+1,K)+W(I,J+1,K-1)-W(I,J-1,K)-W(I,J-1,K-1))*0.25                   1025    169
235  0086F66I       WSE=(W(I+1,J,K+1)+W(I,J,K+1)-W(I+1,J,K-1)-W(I,J,K-1))*0.25                   1026    170
236  00901AI        WSW=(W(I,J,K+1)+W(I-1,J,K+1)-W(I,J,K-1)-W(I-1,J,K-1))*0.25                   1027    171
237  0090CEI        WSN=(W(I,J+1,K+1)+W(I,J,K+1)-W(I,J+1,K-1)-W(I,J,K-1))*0.25                   1028    172
238  009182I        WSS=(W(I,J,K+1)+W(I,J-1,K+1)-W(I,J,K-1)-W(I,J-1,K-1))*0.25                   1029    173
239  009236I        WST=W(I,J,K+1)-W(I,J,K)                                                      1030    174
240  00928AI        WSB=W(I,J,K)-W(I,J,K-1)                                                      1031    175
241  0092DEI        SU(I,J,K)=SU(I,J,K)-PCXI*CX(I,J,K)-PEDA*EX(I,J,K)-PSCI*SX(I,J,K)             1032    176
242  009384I        DV(I,J,K)=DV(I,J,K)-PCXI*CY(I,J,K)-PEDA*EY(I,J,K)-PSCI*SY(I,J,K)             1033    177
243  00948AI        DW(I,J,K)=DW(I,J,K)-PCXI*CZ(I,J,K)-PEDA*EZ(I,J,K)-PSCI*SZ(I,J,K)             1034    178
244  009560I        CXE=(CX(I+1,J,K)+CX(I,J,K))*0.5                                              1035    179
245  009596I        CXW=(CX(I-1,J,K)+CX(I,J,K))*0.5                                              1036    180
246  0096I8I        CXN=(CX(I,J+1,K)+CX(I,J,K))*0.5                                              1037    181
247  009674I        CXS=(CX(I,J,K)+CX(I,J-1,K))*0.5                                              1038    182
248  0096D0I        CXT=(CX(I,J,K+1)+CX(I,J,K))*0.5                                              1039    183
249  009772AI       CXB=(CX(I,J,K)+CX(I,J,K-1))*0.5                                              1040    184
250  009784I        EXE=(EX(I+1,J,K)+EX(I,J,K))*0.5                                              1041    185
251  0097E0I        EXW=(EX(I,J,K)+EX(I-1,J,K))*0.5                                              1042    186
252  009783CI       EXN=(EX(I,J+1,K)+EX(I,J,K))*0.5                                              1043    187
253  009898I        EXS=(EX(I,J,K)+EX(I,J-1,K))*0.5                                              1044    188
254  0098F4I        EXT=(EX(I,J,K+1)+EX(I,J,K))*0.5                                              1045    189
255  00994EI        EXB=(EX(I,J,K)+EX(I,J,K-1))*0.5                                              1046    190
256  0099A8I        SXE=(SX(I+1,J,K)+SX(I,J,K))*0.5                                              1047    191
257  009A04I        SXW=(SX(I,J,K)+SX(I-1,J,K))*0.5                                              1048    192
258  009A60I        SXN=(SX(I,J+1,K)+SX(I,J,K))*0.5                                              1049    193
259  009ABCI        SXS=(SX(I,J,K)+SX(I,J-1,K))*0.5                                              1050    194
260  009B18I        SXT=(SX(I,J,K+1)+SX(I,J,K))*0.5                                              1051    195
261  009B72I        SXB=(SX(I,J,K)+SX(I,J,K-1))*0.5                                              1052    196
262  009BCCI        QE=GAE*(UCE*CXE+UEE*EXE+USE*SXE)                                             1053    197
263  009C00I        QW=GAW*(UCW*CXW+UEW*EXW+USW*SXW)                                             1054    198
264  009C34I        QN=GAN*(UCN*CXN+UEN*EXN+USN*SXN)                                             1055    199
265  009C68I        QS=GAS*(UCS*CXS+UES*EXS+USS*SXS)                                             1056    200
266  009C9CI        QT=GAT*(UCT*CXT+UET*EXT+UST*SXT)                                             1057    201
267  009CD0I        QB=GAB*(UCB*CXB+UEB*EXB+USB*SXB)                                             1058    202
268  009D04I        SOC1=CX(I,J,K)*(QE-QW)+EX(I,J,K)*(QN-QS)+SX(I,J,K)*(QT-QB)                   1059    203
269  009DA4I        QE=GAE*(VCE*CXE+VEE*EXE+VSE*SXE)                                             1060    204
270  009DD8I        QW=GAW*(VCW*CXW+VEW*EXW+VSW*SXW)                                             1061    205
271  009E0CI        QN=GAN*(VCN*CXN+VEN*EXN+VSN*SXN)                                             1062    206
272  009E40I        QS=GAS*(VCS*CXS+VES*EXS+VSS*SXS)                                             1063    207
273  009E74I        QT=GAT*(VCT*CXT+VET*EXT+VST*SXT)                                             1064    208
274  009EA8I        QB=GAB*(VCB*CXB+VEB*EXB+VSB*SXB)                                             1065    209
275  009EDCI        SOC2=CY(I,J,K)*(QE-QW)+EY(I,J,K)*(QN-QS)+SY(I,J,K)*(QT-QB)                   1066    210
276  009F7CI        QE=GAE*(WCE*CXE+WEE*EXE+WSE*SXE)                                             1067    211
277  009FB0I        QW=GAW*(WCW*CXW+WEW*EXW+WSW*SXW)                                             1068    212
278  009FE4I        QN=GAN*(WCN*CXN+WEN*EXN+WSN*SXN)                                             1069    213
279  00A018I        QS=GAS*(WCS*CXS+WES*EXS+WSS*SXS)                                             1070    214
280  00A04CI        QT=GAT*(WCT*CXT+WET*EXT+WST*SXT)                                             1071    215
281  00A080I        QB=GAB*(WCB*CXB+WEB*EXB+WSB*SXB)                                             1072    216
282  00A0B4I        SOC3=CZ(I,J,K)*(QE-QW)+EZ(I,J,K)*(QN-QS)+SZ(I,J,K)*(QT-QB)                   1073    217
283  00A154I        SU(I,J,K)=SU(I,J,K)+SOC1+SOC2+SOC3+APO(I,J,K)*FO(I,J,K)                      1074    218
284  00A206I        CYE=(CY(I+1,J,K)+CY(I,J,K))*0.5                                              1075    219
285  00A262I        CYW=(CY(I,J,K)+CY(I-1,J,K))*0.5                                              1076    220
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286  00A28EI          CYN=(CY(I,J+1,K)+CY(I,J,K))*0.5                                    1077     221
287  00A31AI          CYS=(CY(I,J,K)+CY(I,J-1,K))*0.5                                    1078     222
288  00A376I          CYT=(CY(I,J,K+1)+CY(I,J,K))*0.5                                    1079     223
289  00A300I          CYB=(CY(I,J,K)+CY(I,J,K-1))*0.5                                    1080     224
290  00A42AI          EYE=(EY(I+1,J,K)+EY(I,J,K))*0.5                                    1081     225
291  00A486I          EYW=(EY(I,J,K)+EY(I-1,J,K))*0.5                                    1082     226
292  00A4E2I          EYN=(EY(I,J+1,K)+EY(I,J,K))*0.5                                    1083     227
293  00A53EI          EYS=(EY(I,J,K)+EY(I,J-1,K))*0.5                                    1084     228
294  00A59AI          EYT=(EY(I,J,K+1)+EY(I,J,K))*0.5                                    1085     229
295  00A5F4I          EYB=(EY(I,J,K)+EY(I,J,K-1))*0.5                                    1086     230
296  00A64EI          SYE=(SY(I+1,J,K)+SY(I,J,K))*0.5                                    1087     231
297  00A6AAI          SYW=(SY(I,J,K)+SY(I-1,J,K))*0.5                                    1088     232
298  00A706I          SYN=(SY(I,J+1,K)+SY(I,J,K))*0.5                                    1089     233
299  00A762I          SYS=(SY(I,J,K)+SY(I,J-1,K))*0.5                                    1090     234
300  00A7BEI          SYT=(SY(I,J,K+1)+SY(I,J,K))*0.5                                    1091     235
301  00A818I          SYB=(SY(I,J,K)+SY(I,J,K-1))*0.5                                    1092     236
302  00A872I          QE=GAE*(UCE*CYE+UEE*EYE+USE*SYE)                                   1093     237
303  00A8A6I          QW=GAW*(UCW*CYW+UEW*EYW+USW*SYW)                                   1094     238
304  00A8DAI          QN=GAN*(UCN*CYN+UEN*EYN+USN*SYN)                                   1095     239
305  00A90EI          QS=GAS*(UCS*CYS+UES*EYS+USS*SYS)                                   1096     240
306  00A942I          QT=GAT*(UCT*CYT+UET*EYT+UST*SYT)                                   1097     241
307  00A976I          QB=GAB*(UCB*CYB+UEB*EYB+USB*SYB)                                   1098     242
308  00A9AAI          SOC1=CX(I,J,K)*(QE-QW)+EX(I,J,K)*(QN-QS)+SX(I,J,K)*(QT-QB)         1099     243
309  00AA4AI          QE=GAE*(VCE*CYE+VEE*EYE+VSE*SYE)                                   1100     244
310  00AA7EI          QW=GAW*(VCW*CYW+VEW*EYW+VSW*SYW)                                   1101     245
311  00AAB2I          QN=GAN*(VCN*CYN+VEN*EYN+VSN*SYN)                                   1102     246
312  00AAE6I          QS=GAS*(VCS*CYS+VES*EYS+VSS*SYS)                                   1103     247
313  00AB1AI          QT=GAT*(VCT*CYT+VET*EYT+VST*SYT)                                   1104     248
314  00AB4EI          QB=GAB*(VCB*CYB+VEB*EYB+VSB*SYB)                                   1105     249
315  00AB82I          SOC2=CY(I,J,K)*(QE-QW)+EY(I,J,K)*(QN-QS)+SY(I,J,K)*(QT-QB)         1106     250
316  00AC22I          QE=GAE*(WCE*CYE+WEE*EYE+WSE*SYE)                                   1107     251
317  00AC56I          QW=GAW*(WCW*CYW+WEW*EYW+WSW*SYW)                                   1108     252
318  00AC8AI          QN=GAN*(WCN*CYN+WEN*EYN+WSN*SYN)                                   1109     253
319  00ACBEI          QS=GAS*(WCS*CYS+WES*EYS+WSS*SYS)                                   1110     254
320  00ACF2I          QT=GAT*(WCT*CYT+WET*EYT+WST*SYT)                                   1111     255
321  00AD26I          QB=GAB*(WCB*CYB+WEB*EYB+WSB*SYB)                                   1112     256
322  00AD5AI          SOC3=CZ(I,J,K)*(QE-QW)+EZ(I,J,K)*(QN-QS)+SZ(I,J,K)*(QT-QB)         1113     257
323  00ADFAI          DV(I,J,K)=DV(I,J,K)+SOC1+SOC2+SOC3                                 1114     258
324  00AE58I          CZE=(CZ(I+1,J,K)+CZ(I,J,K))*0.5                                    1115     259
325  00AE94I          CZW=(CZ(I,J,K)+CZ(I-1,J,K))*0.5                                    1116     260
326  00AF10I          CZN=(CZ(I,J+1,K)+CZ(I,J,K))*0.5                                    1117     261
327  00AF6CI          CZS=(CZ(I,J,K)+CZ(I,J-1,K))*0.5                                    1118     262
328  00AFC8I          CZT=(CZ(I,J,K+1)+CZ(I,J,K))*0.5                                    1119     263
329  00B022I          CZB=(CZ(I,J,K)+CZ(I,J,K-1))*0.5                                    1120     264
330  00B07CI          EZE=(EZ(I+1,J,K)+EZ(I,J,K))*0.5                                    1121     265
331  00B0D8I          EZW=(EZ(I,J,K)+EZ(I-1,J,K))*0.5                                    1122     266
332  00B134I          EZN=(EZ(I,J+1,K)+EZ(I,J,K))*0.5                                    1123     267
333  00B190I          EZS=(EZ(I,J,K)+EZ(I,J-1,K))*0.5                                    1124     268
334  00B1ECI          EZT=(EZ(I,J,K+1)+EZ(I,J,K))*0.5                                    1125     269
335  00B246I          EZB=(EZ(I,J,K)+EZ(I,J,K-1))*0.5                                    1126     270
336  00B2A0I          SZE=(SZ(I+1,J,K)+SZ(I,J,K))*0.5                                    1127     271
337  00B2FCI          SZW=(SZ(I,J,K)+SZ(I-1,J,K))*0.5                                    1128     272
338  00B358I          SZN=(SZ(I,J+1,K)+SZ(I,J,K))*0.5                                    1129     273
339  00B3B4I          SZS=(SZ(I,J,K)+SZ(I,J-1,K))*0.5                                    1130     274
340  00B410I          SZT=(SZ(I,J,K+1)+SZ(I,J,K))*0.5                                    1131     275
341  00B46AI          SZB=(SZ(I,J,K)+SZ(I,J,K-1))*0.5                                    1132     276
342  00B4C4I          QE=GAE*(UCE*CZE+UEE*EZE+USE*SZE)                                   1133     277
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343  00B4F8I          QW=GAW*(UCW*CZW+UEW*EZW+USW*SZW)                                    1134     278
344  00B52CI          QN=GAN*(UCN*CZN+UEN*EZN+USN*SZN)                                    1135     279
345  00B560I          QS=GAS*(UCS*CZS+UES*EZS+USS*SZS)                                    1136     280
346  00B594I          QT=GAT*(UCT*CZT+UET*EZT+UST*SZT)                                    1137     281
347  00B5C8I          QB=GAB*(UCB*CZB+UEB*EZB+USB*SZB)                                    1138     282
348  00B5FCI          SOC1=CX(I,J,K)*(QE-QW)+EX(I,J,K)*(QN-QS)+SX(I,J,K)*(QT-QB)          1139     283
349  00B69CI          QE=GAE*(VCE*CZE+VEE*EZE+VSE*SZE)                                    1140     284
350  00B6D0I          QW=GAW*(VCW*CZW+VEW*EZW+VSW*SZW)                                    1141     285
351  00B704I          QN=GAN*(VCN*CZN+VEN*EZN+VSN*SZN)                                    1142     286
352  00B738I          QS=GAS*(VCS*CZS+VES*EZS+VSS*SZS)                                    1143     287
353  00B76CI          QT=GAT*(VCT*CZT+VET*EZT+VST*SZT)                                    1144     288
354  00B7A0I          QB=GAB*(VCB*CZB+VEB*EZB+VSB*SZB)                                    1145     289
355  00B7D4I          SOC2=CY(I,J,K)*(QE-QW)+EY(I,J,K)*(QN-QS)+SY(I,J,K)*(QT-QB)          1146     290
356  00B874I          QE=GAE*(WCE*CZE+WEE*EZE+WSE*SZE)                                    1147     291
357  00B8A8I          QW=GAW*(WCW*CZW+WEW*EZW+WSW*SZW)                                    1148     292
358  00B8DCI          QN=GAN*(WCN*CZN+WEN*EZN+WSN*SZN)                                    1149     293
359  00B910I          QS=GAS*(WCS*CZS+WES*EZS+WSS*SZS)                                    1150     294
360  00B944I          QT=GAT*(WCT*CZT+WET*EZT+WST*SZT)                                    1151     295
361  00B978I          QB=GAB*(WCB*CZB+WEB*EZB+WSB*SZB)                                    1152     296
362  00B9ACI          SOC3=CZ(I,J,K)*(QE-QW)+EZ(I,J,K)*(QN-QS)+SZ(I,J,K)*(QT-QB)          1153     297
363  00BA4CI          DW(I,J,K)=DW(I,J,K)+SOC1+SOC2+SOC3                                  1154     298
364  00BAAAI          SU(I,J,K)=SU(I,J,K)*TJO(I,J,K)                                      1155     299
365  00BB1CI          SP(I,J,K)=SPK(I,J,K)*TJO(I,J,K)                                     1156     300
366  00BB8EI    15    CONTINUE                                                            1157     301
367  00BB8CI          GO TO 6C                                                            1158     302
368               C-----V-SOURCE                                                         1159
369  00BBE2I    2     CONTINUE                                                            1160     303
370  00BBE2I          DO 25 I=IS,IT                                                       1161     304
371  00BBFAI          DO 25 J=JS,JT                                                       1162     305
372  00BC12I          DO 25 K=KS,KT                                                       1163     306
373  00BC2AI          SU(I,J,K)=(DV(I,J,K)+APC(I,J,K)*FO(I,J,K))*TJO(I,J,K)               1164     307
374  00BCEEI    25    CONTINUE                                                            1165     308
375  00BD36I          GO TO 6C                                                            1166     309
376               C-----W-SOURCE                                                         1167
377  00BD3CI    3     CONTINUE                                                            1168     310
378  00BD3CI          DO 35 I=IS,IT                                                       1169     311
379  00BD54I          DO 35 J=JS,JT                                                       1170     312
380  00BD6CI          DO 35 K=KS,KT                                                       1171     313
381  00BD84I          SU(I,J,K)=(DW(I,J,K)+APO(I,J,K)*FO(I,J,K))*TJO(I,J,K)               1172     314
382  00BE48I    35    CONTINUE                                                            1173     315
383  00BE90I          GO TO 6C                                                            1174     316
384               C-----TM-SOURCE                                                        1175
385  00BE96I    4     CONTINUE                                                            1176     317
386  00BE96I          GO TO 6C                                                            1177     318
387               C-----K-SOURCE                                                         1178
388  00BE9CI    5     CONTINUE                                                            1179     319
389  00BE9CI          DO 55 I=IS,IT                                                       1180     320
390  00BEB4I          DO 55 J=JS,JT                                                       1181     321
391  00BECCI          DO 55 K=KS,KT                                                       1182     322
392  00BEE4I          SU(I,J,K)=GEN(I,J,K)+PP(I,J,K)+APO(I,J,K)*FO(I,J,K)                 1183     323
393  00BFAAI          P1=DEN(I,J,K)**2                                                    1184     324
394  00BFDEI          SP(I,J,K)=SPK(I,J,K)-CMU*P1*F(I,J,K)/VISE(I,J,K)                    1185     325
395  00C08AI          SU(I,J,K)=SU(I,J,K)*TJO(I,J,K)                                      1186     326
396  00C0FCI          SP(I,J,K)=SP(I,J,K)*TJO(I,J,K)                                      1187     327
397  00C16EI    55    CONTINUE                                                            1188     328
398  00C186I          GO TO 6C                                                            1189     329
399               C-----E-SOURCE                                                         1190
```

```
400  00C18CI      6   CONTINUE                                                          1191     330
401  00C18CI          DO 65 I=IS,IT                                                     1192     331
402  00C104I          DO 65 J=JS,JT                                                     1193     332
403  00C1ECI          DO 65 K=KS,KT                                                     1194     333
404  00C204I          P1=DEN(I,J,K)**2                                                  1195     334
405  00C238I          SU(I,J,K)=SU(I,J,K)+C1*CMU*GEN(I,J,K)*P1*DK(I,J,K)/               1196     335
406                  1          VISE(I,J,K)+APO(I,J,K)*FO(I,J,K)                      1197
407  00C35CI          TMDK=DK(I,J,K)+SMNUM                                              1198     336
408  00C38EI          SP(I,J,K)=SPK(I,J,K)-C2*DEN(I,J,K)*F(I,J,K)/TMDK                  1199     337
409  00C43AI          SU(I,J,K)=SU(I,J,K)*TJO(I,J,K)                                    1200     338
410  00C4ACI          SP(I,J,K)=SP(I,J,K)*TJO(I,J,K)                                    1201     339
411  00C51EI      65  CONTINUE                                                          1202     340
412  00C566I          GO TO 60                                                          1203     341
413               C-----PF-SOURCE                                                      1204
414  00C56CI      7   CONTINUE                                                          1205     342
415  00C56CI          DO 75 I=IS,IT                                                     1206     343
416  00C584I          DO 75 J=JS,JT                                                     1207     344
417  00C59CI          DO 75 K=KS,KT                                                     1208     345
418  00C5B4I          SU(I,J,K)=SU(I,J,K)+0.85*GEN(I,J,K)+APO(I,J,K)*FO(I,J,K)          1209     346
419  00C680I          TMDK=DK(I,J,K)+SMNUM                                              1210     347
420  00C682I          SP(I,J,K)=SPK(I,J,K)-DE(I,J,K)/TMDK                               1211     348
421  00C72CI          SU(I,J,K)=SU(I,J,K)*TJO(I,J,K)                                    1212     349
422  00C79EI          SP(I,J,K)=SP(I,J,K)*TJO(I,J,K)                                    1213     350
423  00C810I      75  CONTINUE                                                          1214     351
424  00C858I      60  CONTINUE                                                          1215     352
425               C-----MODIFY WALL BOUNDARY CONDITIONS THRU WALL FUNCTIONS             1216
426  00C858I          IF(IG .NE. 2) GO TO 410                                           1217     353
427  00C86EI          CALL BOUNC(IE,F)                                                  1218     355
428  00C89CI  410    CONTINUE                                                           1219     356
429               C-----SET SYMMETRIC, CYCLIC AND EXIT LINK COEFF.                     1220
430  00C89CI          CALL SYMOUT(2,IE,IS,IT,JS,JT,KS,KT)                               1221     357
431               C-----LINK COEFF. ASSEMBLY AND BLOCKAGES                             1222
432  00C8D8I          DO 500 I=IS,IT                                                    1223     358
433  00C8F0I          DO 500 J=JS,JT                                                    1224     359
434  00C908I          DO 500 K=KS,KT                                                    1225     360
435  00C920I          F1(I,J,K)=F(I,J,K)                                                1226     361
436  00C972I          ANAB=AE(I,J,K)+AW(I,J,K)+AN(I,J,K)+AS(I,J,K)+AT(I,J,K)+           1227     362
437                  1     AB(I,J,K)+APO(I,J,K)                                        1228
438  00CA82I          AP(I,J,K)=ANAB-SP(I,J,K)                                          1229     363
439  00CAD4I          PDUV=1.0                                                          1230     364
440  00CAE0I          IF(MC(I,J,K) .LT. 1) GO TO 530                                    1231     365
441  00CB16I          AP(I,J,K)=ALF                                                     1232     367
442  00CB42I          AN(I,J,K)=0.0                                                     1233     368
443  00CB6EI          AS(I,J,K)=0.0                                                     1234     369
444  00CB9AI          AE(I,J,K)=0.0                                                     1235     370
445  00CBC6I          AW(I,J,K)=0.0                                                     1236     371
446  00CBF2I          AT(I,J,K)=0.0                                                     1237     372
447  00CC1EI          AB(I,J,K)=0.0                                                     1238     373
448  00CC4AI          SU(I,J,K)=F(I,J,K)                                                1239     374
449  00CC9CI          PDUV=0.0                                                          1240     375
450  00CCA8I  530    CONTINUE                                                           1241     376
451               C-----UNDER-RELAXATION                                               1242
452  00CCA8I          P1=1.2*AP(I,J,K)                                                  1243     377
453  00CCDAI          AP(I,J,K)=AP(I,J,K)/ALF                                           1244     378
454  00CD2CI          SU(I,J,K)=SU(I,J,K)+PDUV*(1.0-ALF)*AP(I,J,K)*F(I,J,K)             1245     379
455  00CDDCI          IF(IE .EQ. 1) DU(I,J,K)=TJO(I,J,K)*PDUV/(P1-ANAB)                 1246     380
456  00CE4CI  500    CONTINUE                                                           1247     382
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457                C-----LINEAR EQUATIONS SLOVER                                                    1248
458   00CE94I            DO 550 I=1,ISWF                                                          1249     383
459   00CEA8I     550    CALL LINERX(1,IS,JS,KS,IT,JT,KT,F)                                       1250     384
460                C-----CALCULATE MAXIMUM CORRECTION OF CURRENT ITERATION                         1251
461   00CF0CI            DO 555 I=IS,IT                                                           1252     385
462   00CF24I            DO 555 J=JS,JT                                                           1253     386
463   00CF3CI            DO 555 K=KS,KT                                                           1254     387
464   00CF54I            P1=ABS(F(I,J,K)-F1(I,J,K))                                               1255     388
465   00CFCAI            ERRF=AMAX1(ERRF,P1)                                                      1256     389
466   00CFEAI     555    CONTINUE                                                                 1257     390
467   00D032I            RETURN                                                                   1258     391
468                C-------------------------------------------------------------------------     1259
469                C-----P EQUATION                                                                1260
470   00D03AI       10   CONTINUE                                                                 1261     392
471   00D03AI            IS=2                                                                     1262     393
472   00D042I            IT=L                                                                     1263     394
473   00D04EI            JS=2                                                                     1264     395
474   00D056I            JT=M                                                                     1265     396
475   00D062I            KS=2                                                                     1266     397
476   00D06AI            KT=N                                                                     1267     398
477                C-----SOURCE AT PX LOCATIONS                                                    1268
478   00D076I            DO 310 I=IS,IT                                                           1269     399
479   00D08EI            DO 310 J=JS,JT                                                           1270     400
480   00D0A6I            DO 310 K=KS,KT                                                           1271     401
481   00D0BEI            F(I,J,K)=0.0                                                             1272     402
482   00D0F0I            SUK(I,J,K)=0.0                                                           1273     403
483   00D11CI            SPK(I,J,K)=0.0                                                           1274     404
484   00D148I            SP(I,J,K)=0.0                                                            1275     405
485   00D174I            DENE=DEN(I,J,K)                                                          1276     406
486   00D1A0I            DENW=DEN(I-1,J,K)                                                        1277     407
487   00D1D0I            DENN=0.25*(DEN(I,J,K)+DEN(I-1,J,K)+DEN(I,J+1,K)+DEN(I-1,J+1,K))          1278     408
488   00D284I            DENS=0.25*(DEN(I,J,K)+DEN(I-1,J,K)+DEN(I,J-1,K)+DEN(I-1,J-1,K))          1279     409
489   00D338I            DENT=0.25*(DEN(I,J,K)+DEN(I-1,J,K)+DEN(I,J,K+1)+DEN(I-1,J,K+1))          1280     410
490   00D3E8I            DENB=0.25*(DEN(I,J,K)+DEN(I-1,J,K)+DEN(I,J,K-1)+DEN(I-1,J,K-1))          1281     411
491   00D498I            UE=U(I,J,K)                                                              1282     412
492   00D4C4I            UW=U(I-1,J,K)                                                            1283     413
493   00D4F4I            UN=0.25*(U(I,J,K)+U(I-1,J,K)+U(I,J+1,K)+U(I-1,J+1,K))                    1284     414
494   00D5A8I            US=0.25*(U(I,J,K)+U(I-1,J,K)+U(I,J-1,K)+U(I-1,J-1,K))                    1285     415
495   00D65CI            UT=0.25*(U(I,J,K)+U(I-1,J,K)+U(I,J,K+1)+U(I-1,J,K+1))                    1286     416
496   00D70CI            UB=0.25*(U(I,J,K)+U(I-1,J,K)+U(I,J,K-1)+U(I-1,J,K-1))                    1287     417
497   00D7BCI            VE=V(I,J,K)                                                              1288     418
498   00D7E8I            VW=V(I-1,J,K)                                                            1289     419
499   00D818I            VN=0.25*(V(I,J,K)+V(I-1,J,K)+V(I,J+1,K)+V(I-1,J+1,K))                    1290     420
500   00D8CCI            VS=0.25*(V(I,J,K)+V(I-1,J,K)+V(I,J-1,K)+V(I-1,J-1,K))                    1291     421
501   00D980I            VT=0.25*(V(I,J,K)+V(I-1,J,K)+V(I,J,K+1)+V(I-1,J,K+1))                    1292     422
502   00DA30I            VB=0.25*(V(I,J,K)+V(I-1,J,K)+V(I,J,K-1)+V(I-1,J,K-1))                    1293     423
503   00DAE0I            WE=W(I,J,K)                                                              1294     424
504   00DB0CI            WW=W(I-1,J,K)                                                            1295     425
505   00DB3CI            WN=0.25*(W(I,J,K)+W(I-1,J,K)+W(I,J+1,K)+W(I-1,J+1,K))                    1296     426
506   00DBF0I            WS=0.25*(W(I,J,K)+W(I-1,J,K)+W(I,J-1,K)+W(I-1,J-1,K))                    1297     427
507   00DCA4I            WT=0.25*(W(I,J,K)+W(I-1,J,K)+W(I,J,K+1)+W(I-1,J,K+1))                    1298     428
508   00DD54I            WB=0.25*(W(I,J,K)+W(I-1,J,K)+W(I,J,K-1)+W(I-1,J,K-1))                    1299     429
509   00DE04I            CXQ=0.5*(CX(I,J,K)+CX(I-1,J,K))                                          1300     430
510   00DE60I            EXQ=0.5*(EX(I,J,K)+EX(I-1,J,K))                                          1301     431
511   00DE6CI            SXQ=0.5*(SX(I,J,K)+SX(I-1,J,K))                                          1302     432
512   00DF18I            CYQ=0.5*(CY(I,J,K)+CY(I-1,J,K))                                          1303     433
513   00DF74I            EYQ=0.5*(EY(I,J,K)+EY(I-1,J,K))                                          1304     434
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514  000F90I          SYQ=0.5*(SY(I,J,K)+SY(I-1,J,K))                                                    1305     435
515  00E02CI          CZQ=0.5*(CZ(I,J,K)+CZ(I-1,J,K))                                                    1306     436
516  00E088I          EZQ=0.5*(EZ(I,J,K)+EZ(I-1,J,K))                                                    1307     437
517  00E0E4I          SZQ=0.5*(SZ(I,J,K)+SZ(I-1,J,K))                                                    1308     438
518  00E140I          CE=DENE*(UE*CXQ+VE*CYQ+WE*CZQ)                                                     1309     439
519  00E174I          CW=DENW*(UW*CXQ+VW*CYQ+WW*CZQ)                                                     1310     440
520  00E1A8I          CN=DENN*(UN*EXQ+VN*EYQ+WN*EZQ)                                                     1311     441
521  00E1DCI          CS=DENS*(US*EXQ+VS*EYQ+WS*EZQ)                                                     1312     442
522  00E210I          CT=DENT*(UT*SXQ+VT*SYQ+WT*SZQ)                                                     1313     443
523  00E244I          CB=DENB*(UB*SXQ+VB*SYQ+WB*SZQ)                                                     1314     444
524  00E278I          SUK(I,J,K)=-(CE-CW+CN-CS+CT-CB)*(TJO(I-1,J,K)+TJO(I,J,K))*0.5                      1315     445
525  00E322I    310   CONTINUE                                                                           1316     446
526               C-----SOURCE AT PY LOCATIONS                                                          1317
527  00E36AI          DO 311 I=IS,IT                                                                     1318     447
528  00E382I          DO 311 J=JS,JT                                                                     1319     448
529  00E39AI          DO 311 K=KS,KT                                                                     1320     449
530  00E3B2I          DENN=DEN(I,J,K)                                                                    1321     450
531  00E3DEI          DENS=DEN(I,J-1,K)                                                                  1322     451
532  00E40EI          DENE=0.25*(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I+1,J,K)+DEN(I+1,J-1,K))                    1323     452
533  00E4C2I          DENW=0.25*(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I-1,J,K)+DEN(I-1,J-1,K))                    1324     453
534  00E576I          DENT=0.25*(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I,J,K+1)+DEN(I,J-1,K+1))                    1325     454
535  00E626I          DENB=0.25*(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I,J,K-1)+DEN(I,J-1,K-1))                    1326     455
536  00E6D6I          UN=U(I,J,K)                                                                        1327     456
537  00E702I          US=U(I,J-1,K)                                                                      1328     457
538  00E732I          UE=0.25*(U(I,J,K)+U(I,J-1,K)+U(I+1,J,K)+U(I+1,J-1,K))                              1329     458
539  00E7E6I          UW=0.25*(U(I,J,K)+U(I,J-1,K)+U(I-1,J,K)+U(I-1,J-1,K))                              1330     459
540  00E89AI          UT=0.25*(U(I,J,K)+U(I,J-1,K)+U(I,J,K+1)+U(I,J-1,K+1))                              1331     460
541  00E94AI          UB=0.25*(U(I,J,K)+U(I,J-1,K)+U(I,J,K-1)+U(I,J-1,K-1))                              1332     461
542  00E9FAI          VN=V(I,J,K)                                                                        1333     462
543  00EA26I          VS=V(I,J-1,K)                                                                      1334     463
544  00EA56I          VE=0.25*(V(I,J,K)+V(I,J-1,K)+V(I+1,J,K)+V(I+1,J-1,K))                              1335     464
545  00EB0AI          VW=0.25*(V(I,J,K)+V(I,J-1,K)+V(I-1,J,K)+V(I-1,J-1,K))                              1336     465
546  00EB3EI          VT=0.25*(V(I,J,K)+V(I,J-1,K)+V(I,J,K+1)+V(I,J-1,K+1))                              1337     466
547  00EC6EI          VB=0.25*(V(I,J,K)+V(I,J-1,K)+V(I,J,K-1)+V(I,J-1,K-1))                              1338     467
548  00ED1EI          WN=W(I,J,K)                                                                        1339     468
549  00ED4AI          WS=W(I,J-1,K)                                                                      1340     469
550  00ED7AI          WE=0.25*(W(I,J,K)+W(I,J-1,K)+W(I+1,J,K)+W(I+1,J-1,K))                              1341     470
551  00EE2EI          WW=0.25*(W(I,J,K)+W(I,J-1,K)+W(I-1,J,K)+W(I-1,J-1,K))                              1342     471
552  00EEE2I          WT=0.25*(W(I,J,K)+W(I,J-1,K)+W(I,J,K+1)+W(I,J-1,K+1))                              1343     472
553  00EF92I          WB=0.25*(W(I,J,K)+W(I,J-1,K)+W(I,J,K-1)+W(I,J-1,K-1))                              1344     473
554  00F042I          CXQ=0.5*(CX(I,J,K)+CX(I,J-1,K))                                                    1345     474
555  00F09EI          EXQ=0.5*(EX(I,J,K)+EX(I,J-1,K))                                                    1346     475
556  00F0FAI          SXQ=0.5*(SX(I,J,K)+SX(I,J-1,K))                                                    1347     476
557  00F156I          CYQ=0.5*(CY(I,J,K)+CY(I,J-1,K))                                                    1348     477
558  00F1B2I          EYQ=0.5*(EY(I,J,K)+EY(I,J-1,K))                                                    1349     478
559  00F20EI          SYQ=0.5*(SY(I,J,K)+SY(I,J-1,K))                                                    1350     479
560  00F26AI          CZQ=0.5*(CZ(I,J,K)+CZ(I,J-1,K))                                                    1351     480
561  00F2C6I          EZQ=0.5*(EZ(I,J,K)+EZ(I,J-1,K))                                                    1352     481
562  00F322I          SZQ=0.5*(SZ(I,J,K)+SZ(I,J-1,K))                                                    1353     482
563  00F37EI          CE=DENE*(UE*CXQ+VE*CYQ+WE*CZQ)                                                     1354     483
564  00F3B2I          CW=DENW*(UW*CXQ+VW*CYQ+WW*CZQ)                                                     1355     484
565  00F3E6I          CN=DENN*(UN*EXQ+VN*EYQ+WN*EZQ)                                                     1356     485
566  00F41AI          CS=DENS*(US*EXQ+VS*EYQ+WS*EZQ)                                                     1357     486
567  00F44EI          CT=DENT*(UT*SXQ+VT*SYQ+WT*SZQ)                                                     1358     487
568  00F482I          CB=DENB*(UB*SXQ+VB*SYQ+WB*SZQ)                                                     1359     488
569  00F486I          SPK(I,J,K)=-(CE-CW+CN-CS+CT-CB)*(TJO(I,J-1,K)+TJO(I,J,K))*0.5                      1360     489
570  00F560I    311   CONTINUE                                                                           1361     490
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        00F5A8I     C-----SOURCE AT PZ LOCATIONS                                               1362
        00F5A8I           DO 312 I=IS,IT                                                       1363     491
        00F5C0I           DO 312 J=JS,JT                                                       1364     492
        00F5D8I           DO 312 K=KS,KT                                                       1365     493
        00F5F0I           DENT=DEN(I,J,K)                                                      1366     494
        00F61CI           DENB=DEN(I,J,K-1)                                                    1367     495
        00F64AI           DENN=0.25*(DEN(I,J,K)+DEN(I,J,K-1)+DEN(I,J+1,K)+DEN(I,J+1,K-1))      1368     496
        00F6FAI           DENS=0.25*(DEN(I,J,K)+DEN(I,J,K-1)+DEN(I,J-1,K)+DEN(I,J-1,K-1))      1369     497
        00F7AAI           DENE=0.25*(DEN(I,J,K)+DEN(I,J,K-1)+DEN(I+1,J,K)+DEN(I+1,J,K-1))      1370     498
        00F85AI           DENW=0.25*(DEN(I,J,K)+DEN(I,J,K-1)+DEN(I-1,J,K)+DEN(I-1,J,K-1))      1371     499
        00F90AI           UT=U(I,J,K)                                                          1372     500
        00F936I           UB=U(I,J,K-1)                                                        1373     501
        00F964I           UN=C.25*(U(I,J,K)+U(I,J,K-1)+U(I,J+1,K)+U(I,J+1,K-1))                1374     502
        00FA14I           US=C.25*(U(I,J,K)+U(I,J,K-1)+U(I,J-1,K)+U(I,J-1,K-1))                1375     503
        00FAC4I           UE=C.25*(U(I,J,K)+U(I,J,K-1)+U(I+1,J,K)+U(I+1,J,K-1))                1376     504
        00FB74I           UW=C.25*(U(I,J,K)+U(I,J,K-1)+U(I-1,J,K)+U(I-1,J,K-1))                1377     505
        00FC24I           VT=V(I,J,K)                                                          1378     506
        00FC50I           VB=V(I,J,K-1)                                                        1379     507
        00FC7EI           VN=C.25*(V(I,J,K)+V(I,J,K-1)+V(I,J+1,K)+V(I,J+1,K-1))                1380     508
        00FD2EI           VS=C.25*(V(I,J,K)+V(I,J,K-1)+V(I,J-1,K)+V(I,J-1,K-1))                1381     509
        00FDDEI           VE=C.25*(V(I,J,K)+V(I,J,K-1)+V(I+1,J,K)+V(I+1,J,K-1))                1382     510
        00FE8EI           VW=C.25*(V(I,J,K)+V(I,J,K-1)+V(I-1,J,K)+V(I-1,J,K-1))                1383     511
        00FF3EI           WT=W(I,J,K)                                                          1384     512
        00FF6AI           WB=W(I,J,K-1)                                                        1385     513
        00FF98I           WN=C.25*(W(I,J,K)+W(I,J,K-1)+W(I,J+1,K)+W(I,J+1,K-1))                1386     514
        010048I           WS=C.25*(W(I,J,K)+W(I,J,K-1)+W(I,J-1,K)+W(I,J-1,K-1))                1387     515
        0100F8I           WE=C.25*(W(I,J,K)+W(I,J,K-1)+W(I+1,J,K)+W(I+1,J,K-1))                1388     516
        0101A8I           WW=C.25*(W(I,J,K)+W(I,J,K-1)+W(I-1,J,K)+W(I-1,J,K-1))                1389     517
        010258I           CXQ=0.5*(CX(I,J,K)+CX(I,J,K-1))                                      1390     518
        010282I           EXQ=0.5*(EX(I,J,K)+EX(I,J,K-1))                                      1391     519
        01030CI           SXQ=0.5*(SX(I,J,K)+SX(I,J,K-1))                                      1392     520
        010366I           CYQ=0.5*(CY(I,J,K)+CY(I,J,K-1))                                      1393     521
        0103C0I           EYQ=0.5*(EY(I,J,K)+EY(I,J,K-1))                                      1394     522
        01041AI           SYQ=0.5*(SY(I,J,K)+SY(I,J,K-1))                                      1395     523
        010474I           CZQ=0.5*(CZ(I,J,K)+CZ(I,J,K-1))                                      1396     524
        0104CEI           EZQ=0.5*(EZ(I,J,K)+EZ(I,J,K-1))                                      1397     525
        010528I           SZQ=0.5*(SZ(I,J,K)+SZ(I,J,K-1))                                      1398     526
        010582I           CE=DENE*(UE*CXQ+VE*CYQ+WE*CZQ)                                       1399     527
        0105B6I           CW=DENW*(UW*CXQ+VW*CYQ+WW*CZQ)                                       1400     528
        0105EAI           CN=DENN*(UN*EXQ+VN*EYQ+WN*EZQ)                                       1401     529
        01061EI           CS=DENS*(US*EXQ+VS*EYQ+WS*EZQ)                                       1402     530
        010652I           CT=DENT*(UT*SXQ+VT*SYQ+WT*SZQ)                                       1403     531
        010686I           CB=DENB*(UB*SXQ+VB*SYQ+WB*SZQ)                                       1404     532
        0106BAI           SP(I,J,K)=-(CE-CW+CN-CS+CT-CB)*(TJO(I,J,K-1)+TJO(I,J,K))*0.5         1405     533
        010762I       312 CONTINUE                                                             1406     534
                    C-----LINK COEFF. AND SOURCE TERM AT CELL CENTER                           1407
        0107AAI           DO 100 I=IS,IT                                                       1408     535
        0107C2I           DO 100 J=JS,JT                                                       1409     536
        0107DAI           DO 100 K=KS,KT                                                       1410     537
        0107F2I           II=I-1                                                               1411     538
        010800I           JJ=J-1                                                               1412     539
        01080EI           KK=K-1                                                               1413     540
        01081CI           GAE=(DU(I,J,K)+DU(I,JJ,K)+DU(I,J,KK)+DU(I,JJ,KK))*0.25               1414     541
        0108C0I           GAW=(DU(II,J,K)+DU(II,JJ,K)+DU(II,J,KK)+DU(II,JJ,KK))*0.25           1415     542
        010964I           GAN=(DU(I,J,K)+DU(II,J,K)+DU(I,J,KK)+DU(II,J,KK))*0.25               1416     543
        010A08I           GAS=(DU(I,JJ,K)+DU(II,JJ,K)+DU(I,JJ,KK)+DU(II,JJ,KK))*0.25           1417     544
        010AACI           GAT=(DU(I,J,K)+DU(II,J,K)+DU(I,JJ,K)+DU(II,JJ,K))*0.25               1418     545
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010B50I          GAB=(DU(I,J,KK)+DU(II,J,KK)+DU(I,JJ,KK)+DU(II,JJ,KK))*0.25     546
010BF4I          TXXEQ=(TXXE(I,J,K)+TXXE(II,JJ,KK))*0.5                          547
010C4CI          TXXWQ=(TXXW(I,J,K)+TXXW(II,JJ,KK))*0.5                          548
010CA4I          TYYNQ=(TYYN(I,J,K)+TYYN(II,JJ,KK))*0.5                          549
010CFCI          TYYSQ=(TYYS(I,J,K)+TYYS(II,JJ,KK))*0.5                          550
010D54I          TZZTQ=(TZZT(I,J,K)+TZZT(II,JJ,KK))*C.5                          551
010DACI          TZZBQ=(TZZB(I,J,K)+TZZB(II,JJ,KK))*0.5                          552
010E04I          TQ=(TJC(I,J,K)+TJO(II,JJ,KK))*C.5                               553
010E5CI          AE(I,J,K)=TQ*(GAE*TXXEQ)                                        554
010E94I          AW(I,J,K)=TQ*(GAW*TXXWQ)                                        555
010ECCI          AN(I,J,K)=TQ*(GAN*TYYNQ)                                        556
010F04I          AS(I,J,K)=TQ*(GAS*TYYSQ)                                        557
010F3CI          AT(I,J,K)=TQ*(GAT*TZZTQ)                                        558
010F74I          AB(I,J,K)=TQ*(GAB*TZZBQ)
        C-----P' SOURCE
010FACI          P1=1.0                                                          560
010FB8I          P2=1.0                                                          561
010FC4I          P3=1.0                                                          562
010FD0I          P4=1.0                                                          563
010FDCI          P5=1.0                                                          564
010FE8I          P6=1.0                                                          565
010FF4I          IF(GAN .EQ. 0.0) P1=0.0                                         566
011012I          IF(GAS .EQ. 0.0) P2=0.0                                         568
011030I          IF(GAE .EQ. 0.0) P3=0.0                                         570
01104EI          IF(GAW .EQ. 0.0) P4=0.0                                         572
01106CI          IF(GAT .EQ. 0.0) P5=0.0                                         574
01108AI          IF(GAB .EQ. 0.0) P6=0.0                                         576
0110A8I          PQ=C.5*((P1+P2)*(P3+P4+P5+P6)+(P3+P4)*(P1+P2+P5+P6)+            578
                1      (P5+P6)*(P1+P2+P3+P4))
01112AI          IF(PQ .EQ. 0.0) PQ=1.0                                          579
011148I          SU(I,J,K)=(P1*P5*SUK(I,J,K)+P5*P2*SUK(I,J-1,K)+                 581
                1          P2*P6*SUK(I,J-1,K-1)+P6*P1*SUK(I,J,K-1)+
                2          P3*P5*SPK(I,J,K)+P5*P4*SPK(I-1,J,K)+
                3          P4*P6*SPK(I-1,J,K-1)+P6*P3*SPK(I,J,K-1)+
                4          P1*P3*SP(I,J,K)+P3*P2*SP(I,J-1,K)+
                5          P2*P4*SP(I-1,J-1,K)+P4*P1*SP(I-1,J,K))/PQ
01140AI     100  CONTINUE                                                        582
        C-----LINK COEFF. ASSEMBLY AND BLOCKAGES
011452I          DO 870 I=IS,IT                                                  583
01146AI          DO 870 J=JS,JT                                                  584
011482I          DO 870 K=KS,KT                                                  585
01149AI          ANAB=AE(I,J,K)+AW(I,J,K)+AN(I,J,K)+AS(I,J,K)+AT(I,J,K)+AB(I,J,K) 586
011584I          AP(I,J,K)=ANAB                                                  587
0115B0I          IF(MC(I,J,K) .LT. 2) GO TO 870                                  588
0115E6I          AP(I,J,K)=1.0                                                   590
011612I          AE(I,J,K)=0.0                                                   591
01163EI          AW(I,J,K)=0.0                                                   592
01166AI          AN(I,J,K)=0.0                                                   593
011696I          AS(I,J,K)=0.0                                                   594
0116C2I          AT(I,J,K)=0.0                                                   595
0116EEI          AB(I,J,K)=0.0                                                   596
01171AI          SU(I,J,K)=0.0                                                   597
011746I     870  CONTINUE                                                        598
        C-----LINEAR EQUATIONS SOLVER
01178EI          CALL LINERX(2,IS,JS,KS,IT,JT,KT,F)                              599
0117DCI          DO 850 I=1,ISWF                                                 600
0117F0I     850  CALL LINERX(1,IS,JS,KS,IT,JT,KT,F)                              601
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685                C-----PRESSURE AND VELOCITIES CORRECTIONS                              1476
686   011854I            PPREF=F(2,2,2)                                                   1477   602
687   011864I            DO 880 I=IS,IT                                                   1478   603
688   01187CI            DO 880 J=JS,JT                                                   1479   604
689   011894I            DO 880 K=KS,KT                                                   1480   605
690   0118ACI            IF(MC(I,J,K) .GE. 2) GO TO 880                                   1481   606
691   0118E2I            P1=F(I,J,K)-PPREF                                                1482   608
692   01191AI            P(I,J,K)=P(I,J,K)+ALP*P1                                         1483   609
693   011972I            ERRF=AMAX1(ERRF,ABS(P1))                                         1484   610
694   0119AEI        880 CONTINUE                                                         1485   611
695   0119F6I            DO 600 I=2,LT                                                    1486   612
696   011A0AI            DO 600 J=2,MT                                                    1487   613
697   011A1EI            DO 600 K=2,NT                                                    1488   614
698   011A32I            IF(MC(I,J,K) .GE. 1) GO TO 600                                   1489   615
699   011A68I            II=I+1                                                           1490   617
700   011A76I            JJ=J+1                                                           1491   618
701   011A84I            KK=K+1                                                           1492   619
702   011A92I            PE=(F(II,J,K)+F(II,JJ,K)+F(II,J,KK)+F(II,JJ,KK))*0.25            1493   620
703   011B4EI            PW=(F(I,J,K)+F(I,JJ,K)+F(I,J,KK)+F(I,JJ,KK))*0.25                1494   621
704   011C0AI            PN=(F(I,JJ,K)+F(II,JJ,K)+F(I,JJ,KK)+F(II,JJ,KK))*0.25            1495   622
705   011CC6I            PS=(F(I,J,K)+F(II,J,K)+F(I,J,KK)+F(II,J,KK))*0.25                1496   623
706   011D82I            PT=(F(I,J,KK)+F(II,J,KK)+F(I,JJ,KK)+F(II,JJ,KK))*0.25            1497   624
707   011E3EI            PB=(F(I,J,K)+F(II,J,K)+F(I,JJ,K)+F(II,JJ,K))*0.25                1498   625
708   011EFAI            PCXI=PE-PW                                                       1499   626
709   011F0CI            PEDA=PN-PS                                                       1500   627
710   011F1EI            PSCI=PT-PB                                                       1501   628
711   011F30I            CXQ=CX(I,J,K)                                                    1502   629
712   011F5CI            EXQ=EX(I,J,K)                                                    1503   630
713   011F88I            SXQ=SX(I,J,K)                                                    1504   631
714   011FB4I            CYQ=CY(I,J,K)                                                    1505   632
715   011FE0I            EYQ=EY(I,J,K)                                                    1506   633
716   01200CI            SYQ=SY(I,J,K)                                                    1507   634
717   012038I            CZQ=CZ(I,J,K)                                                    1508   635
718   012064I            EZQ=EZ(I,J,K)                                                    1509   636
719   012090I            SZQ=SZ(I,J,K)                                                    1510   637
720   0120BCI            PXX=PCXI*CXQ+PEDA*EXQ+PSCI*SXQ                                   1511   638
721   0120EAI            PYY=PCXI*CYQ+PEDA*EYQ+PSCI*SYQ                                   1512   639
722   012118I            PZZ=PCXI*CZQ+PEDA*EZQ+PSCI*SZQ                                   1513   640
723   012146I            U(I,J,K)=U(I,J,K)-DU(I,J,K)*PXX                                  1514   641
724   0121C0I            V(I,J,K)=V(I,J,K)-DU(I,J,K)*PYY                                  1515   642
725   01223AI            W(I,J,K)=W(I,J,K)-DU(I,J,K)*PZZ                                  1516   643
726   0122B4I        600 CONTINUE                                                         1517   644
727   0122FCI            RETURN                                                           1518   645
728   012304I            END                                                              1519   646

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  SOLVEQ    02/21/86  09:58:31  TABLE SPACE:  18 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 203 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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 1  000000I          SUBROUTINE LINERX(ISOL,IS,JS,KS,LT,MT,NT,F)                    1520
 2  000004I          DIMENSION A(20),B(20),C(20),D(20),F(21,18,10),BB(21,18,10)     1521
 3  000004I          COMMON                                                         1522
 4                  1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),  1523
 5                  2   SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),      1524
 6                  3   AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)       1525
 7               C-----LINEAR EQUATIONS SOLVERS                                     1526
 8  000004I          GO TO (1,2),ISOL                                               1527      1
 9               C-----LINE-RELAXATION USING TOMA                                   1528
10  003C86I        1   CONTINUE                                                     1529      2
11  003C86I          DO 10 I=IS,LT                                                  1530      3
12  003C9EI          DO 10 J=JS,MT                                                  1531      4
13  003C86I          DO 10 K=KS,NT                                                  1532      5
14  003CCEI          BB(I,J,K)=AE(I,J,K)*F(I+1,J,K)+AN(I,J,K)*F(I,J+1,K)+           1533      6
15                  1          SU(I,J,K)                                           1534
16  003DC8I       10 CONTINUE                                                     1535      7
17  003E10I          A(KS-1)=0.0                                                    1536      8
18  003E24I          DO 100 I=IS,LT                                                 1537      9
19  003E3CI          DO 100 J=JS,MT                                                 1538     10
20  003E54I          C(KS-1)=F(I,J,KS-1)                                            1539     11
21  003E90I          DO 101 K=KS,NT                                                 1540     12
22  003EA8I          A(K)=AT(I,J,K)                                                 1541     13
23  003EDAI          B(K)=AB(I,J,K)                                                 1542     14
24  003F0CI          C(K)=BB(I,J,K)+AW(I,J,K)*F(I-1,J,K)+                           1543     15
25                  1     AS(I,J,K)*F(I,J-1,K)                                     1544
26  003FECI          D(K)=AP(I,J,K)                                                 1545     16
27  00401EI          TERM1=D(K)-B(K)*A(K-1)+1.E-30                                  1546     17
28  004054I          TERM=1.0/TERM1                                                 1547     18
29  004066I          A(K)=A(K)*TERM                                                 1548     19
30  004088I   101    C(K)=(C(K)+B(K)*C(K-1))*TERM                                   1549     20
31  0040E0I          DO 102 KK=KS,NT                                                1550     21
32  0040F8I          K=KS+NT-KK                                                     1551     22
33  004110I   102    F(I,J,K)=A(K)*F(I,J,K+1)+C(K)                                  1552     23
34  00419EI   100    CONTINUE                                                       1553     24
35  0041CEI          RETURN                                                         1554     25
36               C-----BLOCK CORRECTION FOR PRESSURE FIELD                          1555
37  0041D6I        2 CONTINUE                                                       1556     26
38  0041D6I          DO 201 I=IS,LT                                                 1557     27
39  0041EEI          A(I)=0.0                                                       1558     28
40  004202I          B(I)=0.0                                                       1559     29
41  004216I          C(I)=0.0                                                       1560     30
42  00422AI          D(I)=0.0                                                       1561     31
43  00423EI          DO 201 J=JS,MT                                                 1562     32
44  004256I          DO 201 K=KS,NT                                                 1563     33
45  00426EI          A(I)=A(I)-AE(I,J,K)                                            1564     34
46  004280I          B(I)=B(I)-AW(I,J,K)                                            1565     35
47  0042F2I          C(I)=C(I)+SU(I,J,K)                                            1566     36
48  004334I   201    CONTINUE                                                       1567     37
49  00437CI          DO 202 I=IS,LT                                                 1568     38
50  004394I          ANAB=-A(I)-B(I)                                                1569     39
51  00439CI   202    D(I)=ANAB*1.5                                                  1570     40
52  0043EEI          DO 203 I=IS+1,LT                                               1571     41
53  00440AI          TERM=B(I)/D(I-1)                                               1572     42
54  00442EI          D(I)=D(I)-TERM*A(I-1)                                          1573     43
55  004462I   203    C(I)=C(I)-TERM*C(I-1)                                          1574     44
56  0044AEI          F(LT,JS,KS)=C(LT)/D(LT)                                        1575     45
57  0044F6I          DO 204 II=IS+1,LT                                              1576     46
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 58  004512I          I=IS+LT-II                                                  1577      47
 59  00452AI     204  F(I,JS,KS)=(C(I)-A(I)*F(I+1,JS,KS))/D(I)                   1578      48
 60  0045CAI          DO 205 I=IS,LT                                              1579      49
 61  0045E2I          PPBLK=F(I,JS,KS)                                            1580      50
 62  004614I          DO 205 J=JS+1,MT                                            1581      51
 63  004630I          DO 205 K=KS+1,NT                                            1582      52
 64  00464CI          F(I,J,K)=PPBLK                                              1583      53
 65  00467EI     205  CONTINUE                                                    1584      54
 66  0046C6I          RETURN                                                      1585      55
 67  0046CEI          END                                                         1586      56

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  LINERX    02/21/86  09:59:43  TABLE SPACE:    3 KB
STATEMENT BUFFER:    20 LINES/1321 BYTES    STACK SPACE: 199 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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000000I          SUBROUTINE BOUNC(IE,F)
000004I          DIMENSION F(21,18,10)
000004I          COMMON
                1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),
                2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,
                3  PP(21,18,10),W(21,18,10),TM(21,18,10)
                1/PRCP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN
                1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)
                1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),
                2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),
                3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(800),
                4 TAUW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO
                1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),
                2    SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),
                3    AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)
000004I          COMMON
                1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),
                2    CX(21,18,10),CY(21,18,10),CZ(21,18,10),
                3    EX(21,18,10),EY(21,18,10),EZ(21,18,10),
                3    SX(21,18,10),SY(21,18,10),SZ(21,18,10)
                1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,
                2    ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT
        C-----EVALUATE WALL BOUNDARY CONDITIONS USING WALL FUNCTIONS
000004I          DO 150 III=1,IITO                                              1
000024I          I=IBC(III)                                                     2
000038I          J=JBC(III)                                                     3
00004CI          K=KBC(III)                                                     4
000060I          GO TO (1,2,3,4,5,6), IITY(III)                                 5
00009EI      1   CONTINUE                                                       6
        C-----NORTH
00009EI          YP=YN(III)                                                     7
0000B2I          YP1=YN1(III)                                                   8
0000C6I          CDK=DK(I,J,K)                                                  9
0000F2I          CDE=DE(I,J,K)                                                  10
00011EI          CDEN=DEN(I,J,K)                                                11
00014AI          CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),        12
                1     SINZ(III),F(I,J+1,K),AN(I,J,K),SU(I,J,K),SP(I,J,K),
                2     TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),
                3     U(I,J+1,K),V(I,J+1,K),W(I,J+1,K),U(I,J,K),V(I,J,K),
                4     W(I,J,K),U(I,J-1,K),V(I,J-1,K),W(I,J-1,K),
                5    -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJO(I,J,K))
000584I          GO TO 150                                                      13
00058AI      2   CONTINUE                                                       14
        C-----SOUTH
00058AI          YP=YN(III)                                                     15
0005CEI          YP1=YN1(III)                                                   16
0005E2I          CDK=DK(I,J,K)                                                  17
00060EI          CDE=DE(I,J,K)                                                  18
00063AI          CDEN=DEN(I,J,K)                                                19
000666I          CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),        20
                1     SINZ(III),F(I,J-1,K),AN(I,J,K),SU(I,J,K),SP(I,J,K),
                2     TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),
                3     U(I,J-1,K),V(I,J-1,K),W(I,J-1,K),U(I,J,K),V(I,J,K),
                4     W(I,J,K),U(I,J+1,K),V(I,J+1,K),W(I,J+1,K),
                5    -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJO(I,J,K))
000AD0I          GO TO 150                                                      21
000AD6I      3   CONTINUE                                                       22
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                C-----EAST                                                              1644
000AD6I                 YP=YN(III)                                                      1645        23
000AEAI                 YP1=YN1(III)                                                    1646        24
000AFEI                 CDK=DK(I,J,K)                                                   1647        25
000B2AI                 CDE=DE(I,J,K)                                                   1648        26
000B56I                 CDEN=DEN(I,J,K)                                                 1649        27
000B82I                 CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),         1650        28
                       1      SINZ(III),F(I+1,J,K),AN(I,J,K),SU(I,J,K),SP(I,J,K),     1651
                       2      TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),             1652
                       3      U(I+1,J,K),V(I+1,J,K),W(I+1,J,K),U(I,J,K),V(I,J,K),     1653
                       4      W(I,J,K),U(I-1,J,K),V(I-1,J,K),W(I-1,J,K),              1654
                       5     -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJC(I,J,K))   1655
000FECI                 GO TO 150                                                       1656        29
000FF2I           4     CONTINUE                                                        1657        30
                C-----WEST                                                              1658
000FF2I                 YP=YN(III)                                                      1659        31
001006I                 YP1=YN1(III)                                                    1660        32
001014I                 CDK=DK(I,J,K)                                                   1661        33
001046I                 CDE=DE(I,J,K)                                                   1662        34
001072I                 CDEN=DEN(I,J,K)                                                 1663        35
00109EI                 CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),         1664        36
                       1      SINZ(III),F(I-1,J,K),AN(I,J,K),SU(I,J,K),SP(I,J,K),     1665
                       2      TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),             1666
                       3      U(I-1,J,K),V(I-1,J,K),W(I-1,J,K),U(I,J,K),V(I,J,K),     1667
                       4      W(I,J,K),U(I+1,J,K),V(I+1,J,K),W(I+1,J,K),              1668
                       5     -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJC(I,J,K))   1669
0015C8I                 GO TO 150                                                       1670        37
0015CEI           5     CONTINUE                                                        1671        38
                C-----TOP                                                               1672
0015CEI                 YP=YN(III)                                                      1673        39
001622I                 YP1=YN1(III)                                                    1674        40
001636I                 CDK=DK(I,J,K)                                                   1675        41
001662I                 CDE=DE(I,J,K)                                                   1676        42
00168EI                 CDEN=DEN(I,J,K)                                                 1677        43
0016BAI                 CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),         1678        44
                       1      SINZ(III),F(I,J,K+1),AN(I,J,K),SU(I,J,K),SP(I,J,K),     1679
                       2      TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),             1680
                       3      U(I,J,K+1),V(I,J,K+1),W(I,J,K+1),U(I,J,K),V(I,J,K),     1681
                       4      W(I,J,K),U(I,J,K-1),V(I,J,K-1),W(I,J,K-1),              1682
                       5     -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJC(I,J,K))   1683
001A18I                 GO TO 150                                                       1684        45
001A1EI           6     CONTINUE                                                        1685        46
                C-----BOTTOM                                                            1686
001A1EI                 YP=YN(III)                                                      1687        47
001A32I                 YP1=YN1(III)                                                    1688        48
001A46I                 CDK=DK(I,J,K)                                                   1689        49
001A72I                 CDE=DE(I,J,K)                                                   1690        50
001A9EI                 CDEN=DEN(I,J,K)                                                 1691        51
001ACAI                 CALL WALLFN(IE,YP,YP1,CDK,CDE,CDEN,SINX(III),SINY(III),         1692        52
                       1      SINZ(III),F(I,J,K-1),AN(I,J,K),SU(I,J,K),SP(I,J,K),     1693
                       2      TAUN(III),YPLN(III),GEN(I,J,K),VISE(I,J,K),             1694
                       3      U(I,J,K-1),V(I,J,K-1),W(I,J,K-1),U(I,J,K),V(I,J,K),     1695
                       4      W(I,J,K),U(I,J,K+1),V(I,J,K+1),W(I,J,K+1),              1696
                       5     -SPK(I,J,K),SPK(I,J,K),ANV1(III),ANW1(III),TJC(I,J,K))   1697
001F28I          150  CONTINUE                                                        1698        53
001F40I                 RETURN                                                          1699        54
001F46I                 END                                                             1700        55
```

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NO  ERRORS:F7D  R05-01.DC  SUBROUTINE  BOUNC      02/21/86  10:00:46  TABLE SPACE:    7 KB
STATEMENT BUFFER:    20 LINES/1321 BYTES     STACK SPACE: 136 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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      SUBROUTINE WALLFN(IE,YP,YP1,DK1,DE1,DEN1,SINX1,SINY1,                1701
     1      SINZ1,F1,AN1,SU1,SP1,                                          1702
     2      TAUN1,YPLN1,GEN1,VISE1,                                        1703
     3      U1,V1,W1,UC,VC,                                                1704
     4      WC,U2,V2,W2,                                                   1705
     5      SUK1,SPK1,ANV2,ANW2,TJC1)                                      1706
      COMMON                                                               1707
     1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN                1708
     1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,MINUM,SMNUM,ANV1(800),      1709
     2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),           1710
     3 YPLN(800),TAUN(800),IBC(800),JBC(800),KBC(800),IITY(300),           1711
     4 TAUW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO            1712
C-----WALL FUNCTIONS USING LOGARITHMIC WALL LAW                            1713
      GO TO (1,2,3,4,5,6,7), IE                                            1714      1
    1 CONTINUE                                                             1715      2
C-----U                                                                    1716
      SQRTK=SQRT(DK1)                                                      1717      3
      YPLN1=DEN1*SQRTK*CMU1*YP/VISC                                        1718      4
      IF(YPLN1 .LE. 11.63) GO TO 111                                       1719      5
      TMULT=DEN1*CMU1*SQRTK*CK/ALOG(E*YPLN1)                               1720      7
      GO TO 112                                                            1721      8
  111 TMULT=VISC/YP                                                        1722      9
  112 TAUN1=-TMULT                                                         1723     10
      PTA=TJC1*SINX1*TMULT/YP1                                             1724     11
      SP1=SP1-PTA                                                          1725     12
      SU1=SU1+PTA*F1                                                       1726     13
      P1=SQRT(1.-SINX1**2)                                                 1727     14
      ANV2=AN1*SQRT(1.-SINY1**2)                                           1728     15
      ANW2=AN1*SQRT(1.-SINZ1**2)                                           1729     16
      AN1=P1*AN1                                                           1730     17
      RETURN                                                               1731     18
    2 CONTINUE                                                             1732     19
C-----V                                                                    1733
      TMULT=-TAUN1                                                         1734     20
      PTA=TJC1*SINY1*TMULT/YP1                                             1735     21
      SP1=SP1-PTA                                                          1736     22
      SU1=SU1+PTA*F1                                                       1737     23
      AN1=ANV2                                                             1738     24
      RETURN                                                               1739     25
    3 CONTINUE                                                             1740     26
C-----W                                                                    1741
      TMULT=-TAUN1                                                         1742     27
      PTA=TJC1*SINZ1*TMULT/YP1                                             1743     28
      SP1=SP1-PTA                                                          1744     29
      SU1=SU1+PTA*F1                                                       1745     30
      AN1=ANW2                                                             1746     31
      RETURN                                                               1747     32
    4 CONTINUE                                                             1748     33
C-----TM                                                                   1749
      RETURN                                                               1750     34
    5 CONTINUE                                                             1751     35
C-----K                                                                    1752
      SQRTK=SQRT(DK1)                                                      1753     36
      IF(YPLN1 .LE. 11.63) GO TO 511                                       1754     37
      DITM=DEN1*CMU2*SQRTK*ALOG(E*YPLN1)/(CK*YP)                           1755     39
      GO TO 512                                                            1756     40
  511 DITM=DEN1*CMU2*SQRTK*YPLN1/YP                                        1757     41
```

```
0003ACI    512  CONTINUE                                         1758   42
0003ACI         DDU=U0-U1                                        1759   43
00038EI         DDV=V0-V1                                        1760   44
0003D0I         DDW=W0-W1                                        1761   45
0003E2I         P1=DDU**2+DDV**2+DDW**2                          1762   46
00042AI         DDU=U2-U1                                        1763   47
00043CI         DDV=V2-V1                                        1764   48
00044EI         DDW=W2-W1                                        1765   49
000460I         P2=DDU**2+DDV**2+DDW**2                          1766   50
0004A8I         YP2=2*YP1-YP                                     1767   51
0004C0I         GENR=GEN1-VISE1*P2/YP2/YP2                       1768   52
0004E6I         IF(GENR .LE. 0.0) GENR=0.0                       1769   53
000504I         SU1=TJC1*(SUK1*DK1+(P1*TAUN1**2/VISE1+GENR))     1770   55
00053EI         SP1=TJC1*(SPK1-DITM)                             1771   56
000556I         AN1=0.0                                          1772   57
000562I         RETURN                                           1773   58
000568I      6  CONTINUE                                         1774   59
             C-----E                                             1775
000568I         TERM=CMU2/(CK*YP)                                1776   60
000582I         SU1=HINUM*TERM*DK1**1.5                          1777   61
000582I         SP1=-HINUM                                       1778   62
0005C4I         RETURN                                           1779   63
0005CAI      7  CONTINUE                                         1780   64
             C-----PF                                            1781
0005CAI         RETURN                                           1782   65
0005D0I         END                                              1783   66

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  WALLFN    02/21/86  10:01:12  TABLE SPACE:   5 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 122 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
```

```
 1  000000I          SUBROUTINE SYMOUT(IC,IE,IS,IT,JS,JT,KS,KT)                                  1784
 2  000004I          COMMON                                                                      1785
 3                  1/VAR/U(21,18,10),V(21,18,10),P(21,18,10),DK(21,18,10),                     1786
 4                  2  DE(21,18,10),ERRU,ERRV,ERRM,ERRK,ERRE,ERRW,                              1787
 5                  3  PP(21,18,10),W(21,18,10),TM(21,18,10)                                    1788
 6                  1/PROP/ VISE(21,18,10),DEN(21,18,10),VISC,DENIN,FLOWIN                      1789
 7                  1/PCOR/ DU(21,18,10),DV(21,18,10),DW(21,18,10)                              1790
 8                  1/COEF/ AP(21,18,10),SU(21,18,10),SP(21,18,10),SUK(21,18,10),               1791
 9                  2   SPK(21,18,10),AE(21,18,10),AW(21,18,10),AN(21,18,10),                  1792
10                  3   AS(21,18,10),AT(21,18,10),AB(21,18,10),APO(21,18,10)                   1793
11  000004I          COMMON                                                                      1794
12                  1/TRAN/ X(21,18,10),Y(21,18,10),Z(21,18,10),TJO(21,18,10),                  1795
13                  2   CX(21,18,10),CY(21,18,10),CZ(21,18,10),                                 1796
14                  3   EX(21,18,10),EY(21,18,10),EZ(21,18,10),                                 1797
15                  3   SX(21,18,10),SY(21,18,10),SZ(21,18,10)                                  1798
16                  1/UNSTDY/UO(21,18,10),VO(21,18,10),WO(21,18,10),DKO(21,18,10),              1799
17                  2   CEO(21,18,10),DENO(21,18,10),TMO(21,18,10)                              1800
18                  1/LIMT/ L,M,LT,MT,L1,L2,M1,M2,LO,MO,ISWU,ISWV,ISWP,ISWK,ISWE,               1801
19                  2   ALU,ALV,ALP,ALK,ALE,ALVIS,ALW,N,N1,N2,NO,ISWW,IG,NT,ALC,DTT             1802
20              C-----SYMMETRIC, CYCLIC AND EXIT CONDITIONS AND LINK MODIFICATIONS               1803
21  000004I          GO TO (1,2,3), IC                                                           1804        1
22  00002EI      1   CONTINUE                                                                    1805        2
23              C-----BOTTOM                                                                    1806
24  00002EI          K=1                                                                         1807        3
25  000036I          DO 10 I=1,L                                                                 1808        4
26  00004AI          DO 10 J=2,MT                                                                1809        5
27  00005EI          U(I,J,K)=U(I,J,K+1)                                                         1810        6
28  0000ACI          V(I,J,K)=V(I,J,K+1)                                                         1811        7
29  0000FAI          W(I,J,K)=0.0                                                                1812        8
30  00012CI          TM(I,J,K)=TM(I,J,K+1)                                                       1813        9
31  000174I          DK(I,J,K)=DK(I,J,K+1)                                                       1814       10
32  0001C2I          DE(I,J,K)=DE(I,J,K+1)                                                       1815       11
33  000210I      10  CONTINUE                                                                    1816       12
34              C-----EAST OUT (BASED ON INFLOW MASS FLOW RATE)                                  1817
35  000240I          I=IT                                                                        1818       13
36  00024CI          FLOW=0.0                                                                    1819       14
37  000258I          ARDEN=0.0                                                                   1820       15
38  000264I          DO 50 J=2,JT                                                                1821       16
39  000278I          DO 50 K=2,KT                                                                1822       17
40  00028CI          UC=(V(I,J,K)+V(I,J-1,K)+V(I,J,K-1)+V(I,J-1,K-1))*0.25                       1823       18
41  00033CI          DENC=(DEN(I,J,K)+DEN(I,J-1,K)+DEN(I,J,K-1)+DEN(I,J-1,K-1))*0.25             1824       19
42  0003ECI          P1=(X(I,J,K)+X(I,J,K-1)-X(I,J-1,K)-X(I,J-1,K-1))*0.5                        1825       20
43  00049CI          P2=(Y(I,J,K)+Y(I,J,K-1)-Y(I,J-1,K)-Y(I,J-1,K-1))*0.5                        1826       21
44  00054CI          P3=(Z(I,J,K)+Z(I,J,K-1)-Z(I,J-1,K)-Z(I,J-1,K-1))*0.5                        1827       22
45  0005FCI          Q1=(X(I,J,K)+X(I,J-1,K)-X(I,J,K-1)-X(I,J-1,K-1))*0.5                        1828       23
46  0006ACI          Q2=(Y(I,J,K)+Y(I,J-1,K)-Y(I,J,K-1)-Y(I,J-1,K-1))*0.5                        1829       24
47  00075CI          Q3=(Z(I,J,K)+Z(I,J-1,K)-Z(I,J,K-1)-Z(I,J-1,K-1))*0.5                        1830       25
48  00080CI          AREA=SQRT(P1*P1+P2*P2+P3*P3)*SQRT(Q1*Q1+Q2*Q2+Q3*Q3)                         1831       26
49  0008A8I          FLOW=FLOW+DENC*AREA*UC                                                      1832       27
50  0008C6I          ARDEN=ARDEN+DENC*AREA                                                       1833       28
51  0008DEI      50  CONTINUE                                                                    1834       29
52  0009DEI          UINC=(FLOW-FLOWIN)/ARDEN                                                    1835       30
53  000926I          DO 60 J=2,JT                                                                1836       31
54  00093AI          DO 60 K=2,KT                                                                1837       32
55  00094EI          U(I+1,J,K)=U(I,J,K)                                                         1838       33
56  00099EI          V(I+1,J,K)=V(I,J,K)-UINC                                                    1839       34
57  0009F4I          W(I+1,J,K)=W(I,J,K)                                                         1840       35
```

```
 58  000A44I          DK(I+1,J,K)=DK(I,J,K)                                  1841      36
 59  000A94I          DE(I+1,J,K)=DE(I,J,K)                                  1842      37
 60  000AE4I       60 CONTINUE                                               1843      38
 61  000B14I          RETURN                                                 1844      39
 62                C-----LINK COEFF. MODIFICATIONS                           1845
 63  000B1AI       2  CONTINUE                                               1846      40
 64                C-----EAST OUT                                            1847
 65  000B1AI          I=IT                                                   1848      41
 66  000B26I          DO 200 J=2,JT                                          1849      42
 67  000B3AI          DO 200 K=2,KT                                          1850      43
 68  000B4EI          AE(I,J,K)=0.0                                          1851      44
 69  000B7AI     200  CONTINUE                                               1852      45
 70  000BAAI          RETURN                                                 1853      46
 71                C-----UPDATE UNSTEADY COEFF.                              1854
 72  000BB0I       3  CONTINUE                                               1855      47
 73  000BB0I          IF(DTT .NE. 0.0) GO TO 301                             1856      48
 74  000BC8I          DO 300 I=IS,IT                                         1857      50
 75  000BE0I          DO 300 J=JS,JT                                         1858      51
 76  000BF8I          DO 300 K=KS,KT                                         1859      52
 77  000C10I     300  APO(I,J,K)=0.0                                         1860      53
 78  000C84I          RETURN                                                 1861      54
 79  000C8AI     301  CONTINUE                                               1862      55
 80  000C8AI          DO 310 I=IS,IT                                         1863      56
 81  000CA2I          DO 310 J=JS,JT                                         1864      57
 82  000CBAI          DO 310 K=KS,KT                                         1865      58
 83  000CD2I          APO(I,J,K)=DENO(I,J,K)/DTT                             1866      59
 84  000D24I          UO(I,J,K)=U(I,J,K)                                     1867      60
 85  000D70I          VO(I,J,K)=V(I,J,K)                                     1868      61
 86  000DBCI          WO(I,J,K)=W(I,J,K)                                     1869      62
 87  000E08I          TMO(I,J,K)=TM(I,J,K)                                   1870      63
 88  000E54I          DKO(I,J,K)=DK(I,J,K)                                   1871      64
 89  000EA0I          DEO(I,J,K)=DE(I,J,K)                                   1872      65
 90  000EECI     310  CONTINUE                                               1873      66
 91  000F34I          RETURN                                                 1874      67
 92  000F3AI          END                                                    1875      68

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  SYMOUT    02/21/86  10:01:59  TABLE SPACE:   7 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 181 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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```
  1  0000001          SUBROUTINE WALVAL(PW,IS,IT,JS,JT,KS,KT,F)                                1876
  2  0000041          DIMENSION F(21,18,10)                                                    1877
  3  0000341          COMMON                                                                   1878
  4                  1/TUR/ SIGK,SIGE,CMU,C1,C2,CMU1,CMU2,E,CK,HINUM,SMNUM,ANV1(800),         1879
  5                  2 YN(800),YN1(800),SINX(800),SINY(800),SINZ(800),ANW1(800),              1880
  6                  3 YPLN(800),TAUN(800),I3C(800),J3C(800),K3C(800),IITY(800),              1881
  7                  4 TAUW(800),GEN(21,18,10),MC(21,18,10),IJLO(21,18,10),IITO               1882
  8            C-----ASSIGN WALL VALUES                                                       1883
  9  0000341          DO 10 J=JS,JT                                                            1884        1
 10  0000281          DO 10 K=KS,KT                                                            1885        2
 11  0000401          F(IS-1,J,K)=PW*F(IS,J,K)                                                 1886        3
 12  0000A21     10   F(IT+1,J,K)=PW*F(IT,J,K)                                                 1887        4
 13  0001341          DO 20 I=IS-1,IT+1                                                        1888        5
 14  0001521          DO 20 K=KS,KT                                                            1889        6
 15  00016A1          F(I,JS-1,K)=PW*F(I,JS,K)                                                 1890        7
 16  0001CC1     20   F(I,JT+1,K)=PW*F(I,JT,K)                                                 1891        8
 17  00025E1          DO 30 I=IS-1,IT+1                                                        1892        9
 18  0002701          DO 30 J=JS-1,JT+1                                                        1893       10
 19  00029A1          F(I,J,KS-1)=PW*F(I,J,KS)                                                 1894       11
 20  0002FA1     30   F(I,J,KT+1)=PW*F(I,J,KT)                                                 1895       12
 21  00038A1          DO 40 III=1,IITO                                                         1896       13
 22  00039E1          I=I3C(III)                                                               1897       14
 23  0003B21          J=J3C(III)                                                               1898       15
 24  0003C61          K=K3C(III)                                                               1899       16
 25  0003DA1          GO TO (1,2,3,4,5,6), IITY(III)                                           1900       17
 26  0004161     1    F(I,J+1,K)=PW*F(I,J,K)                                                   1901       18
 27  0004781          GO TO 40                                                                 1902       19
 28  0004781     2    F(I,J-1,K)=PW*F(I,J,K)                                                   1903       20
 29  0004E01          GO TO 40                                                                 1904       21
 30  0004E61     3    F(I+1,J,K)=PW*F(I,J,K)                                                   1905       22
 31  0005481          GO TO 40                                                                 1906       23
 32  0005461     4    F(I-1,J,K)=PW*F(I,J,K)                                                   1907       24
 33  0005801          GO TO 40                                                                 1908       25
 34  0005861     5    F(I,J,K+1)=PW*F(I,J,K)                                                   1909       26
 35  0006161          GO TO 40                                                                 1910       27
 36  00061C1     6    F(I,J,K-1)=PW*F(I,J,K)                                                   1911       28
 37  00067C1     40   CONTINUE                                                                 1912       29
 38  0006941          RETURN                                                                   1913       30
 39  00069A1          END                                                                      1914       31

NO  ERRORS:F7D  R05-01.0C  SUBROUTINE  WALVAL    02/21/86  10:02:24  TABLE SPACE:   3 KB
STATEMENT BUFFER:   20 LINES/1321 BYTES    STACK SPACE: 154 WORDS
SINGLE PRECISION FLOATING PT SUPPORT REQUIRED FOR EXECUTION
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