PROGRAM STACONE

C STATIC CONE PENETRATION TEST

C SHEAR-BAND = COULOMB FAILURE SURFACE

C UNIQUE SOLUTION OF INITIAL STRESS METHOD

C MONOTONOUSLY LOADING

C AXI-SYMMETRIC CONDITION

C COMPRESSIVE STRESSES ARE POSITIVE

C

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 COMMON/LB21/PS1(1250),PS3(1250),QS1(1250),QS3(1250)

 COMMON/LB22/TTS(1250)

C

 CALL INPUTS

 CALL PREPAR(IND)

 IF(IND.NE.1) GO TO 10

 CALL INISTR

 10 CLOSE(5)

 CLOSE(6)

 CLOSE(7)

 CLOSE(8)

 CLOSE(11)

 CLOSE(12)

 CLOSE(13)

 STOP

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE INPUTS

C \*\*\* DATA INPUT

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION PNA(20),TY(1690),EE1(30),PP1(30),HH1(30),

 \* RO1(30),CC1(30),FA1(30),DL1(30),FAI(1690),DLT(1690),

 \* STII(50,4)

 DIMENSION IDATA(12),IDATAQ(12),IBA(1690),NET(6),NM(1690),

 \* MAT(1690),JSTP(30),IFL(30),IST(1250)

C

 OPEN(5,FILE='DASTACONE',STATUS='UNKNOWN')

 OPEN(6,FILE='PRSTACONE',STATUS='UNKNOWN')

 OPEN(7,FILE='DSTRESS',STATUS='UNKNOWN')

 OPEN(8,FILE='PRDISPL',STATUS='UNKNOWN')

 OPEN(11,FILE='M-AVS1.INP',STATUS='UNKNOWN')

 OPEN(12,FILE='M-AVS2.INP',STATUS='UNKNOWN')

 OPEN(13,FILE='M-AVS3.INP',STATUS='UNKNOWN')

C

C NN: MAXIMUM NUMBER OF DISPLACEMENT VARIABLES

C NVM: MAXIMUM NUMBER OF INITIAL-STRESS VARIABLES

 NN=2600

 NVM=2150

 DO 2 I=1,5

 2 IDATAQ(I)=0.D0

 DO 4 I=1,6

 4 NET(I)=0

C PNA(I): PROJECT NAME

 READ(5,100) (PNA(I),I=1,15)

 WRITE(6,100) (PNA(I),I=1,15)

C NNP: NUMBER OF NODES, NNE:NUMBER OF ELEMENTS

C NMAT: NUMBER OF MATERIALS

C NFL: NUMBER OF LOAD POINTS

C NIS: NUMBER OF SETS OF ACTUAL INITIAL-STRESSES

C ITER=0: NO ITERATION, 1:ITERATION

C NTRY: NUMBER OF ITERATIONS FOR NO-TENSION ELEMENT

C ICR=0: NOT CONSIDER CRITICAL STATE

C 1: CONSIDER AFTER FIRST YIELDING (PERFECTLY PLASTIC)

C ONLY FOR MOHR-COULOMB MATERIAL

C 2: CONSIDER AFTER FIRST YIELDING (PERFECTLY PLASTIC)

C BOTH FOR MOHR-COULOMB & COULOMB MATERIALS

C IPR=0: NOT PRINT NODAL & ELEMENT DATA, 1:PRINT

C NSTP: NUMBER OF LOADING-STEPS

C MSTP: ACTUAL CALCULATION NUMBER OF LOADING-STEPS

C KSTP: NUMBER OF LOADING-STEPS FOR MICRO-AVS OUTPUT

C JSTP: STEP NO. OUTPUT FOR MICRO-AVS

C

 READ(5,101) NNP,NNE,NMAT,NFL,NIS,ITER,NTRY

 READ(5,101) ICR,IPR

 READ(5,101) NSTP,MSTP,KSTP

 READ(5,101) (JSTP(N),N=1,KSTP)

 DO 6 N=1,NSTP

 6 LSTP(N)=0

 DO 8 L=1,KSTP

 N=JSTP(L)

 LSTP(N)=1

 8 CONTINUE

 IF(NSTP.LE.0) NSTP=1

 IF(MSTP.LE.0) MSTP=NSTP

 IF(NTRY.LE.0) NTRY=1

 WRITE(6,200) NNP,NNE,NMAT,NFL,NIS,ITER,NTRY,

 \* ICR,IPR,

 \* NSTP,MSTP,KSTP,(JSTP(N),N=1,KSTP)

 IDY=0

 NDY=3

 MDY=1

 IF(IDY.GE.1) NDY=1

 IF(IDY.GE.1) MDY=3

C

C \*\*\* NODAL DATA

C K: NODE NO., XX(I):X-COORDINATE, YY(I):Y-COORDINATE

C IX(I)=0: X-DIRECTION FREE, 1=FIXED

C IY(I)=0: Y-DIRECTION FREE, 1=FIXED

C IQ(I)=0: ROTATION FREE, 1=FIXED

C

 WRITE(6,201)

 DO 10 I=1,NNP

 READ(5,102) K,XX(I),YY(I),IX(I),IY(I),IQ(I)

 IF(IPR.EQ.0) GO TO 10

 WRITE(6,102) K,XX(I),YY(I),IX(I),IY(I),IQ(I)

 10 CONTINUE

C \*\*\* ELEMENT DATA

C K: ELEMENT NO., IJK(L,I): NODE NO.

C K2(L)= ELEMENT TYPE: TRUSS=1, BEAM=2, TEXTILE=3,

C PLANE-STRAIN (ELASTIC=4, ELASTIC-PLASTIC=5),

C INTERFACE=6 (I-J:SHEAR DIRECTION, ANTI-CLOCKWISE)

C MAT(L): MATERAL NO.

C IBA(L)=1: CONSIDER OWN WEIGHT, 0:NOT CONSIDER

C IST(L): NO. OF SET OF ACTUAL INITIAL STRESSES

C LRE(L): TYPE OF SHEAR BAND DIRECTION (1 OR 2)

C \*\*\* IF DATA(I)=0, PRECEDING VALUE IS EMPLOYED

C

 DO 12 L=1,NNE

 READ(5,103) K,(IJK(L,I),I=1,4),(IDATA(I),I=1,5)

 DO 14 I=1,12

 IF(IDATA(I).EQ.0) IDATA(I)=IDATAQ(I)

 IF(IDATA(I).LT.0) IDATA(I)=0

 14 IDATAQ(I)=IDATA(I)

 K2(L)= IDATA(1)

 MAT(L)=IDATA(2)

 IBA(L)=IDATA(3)

 IST(L)=IDATA(4)

 LRE(L)=IDATA(5)

 12 CONTINUE

C \*\*\* MATERIAL PARAMETERS

C EE1(M): YOUNG'S MODULUS FOR K2=1-5, SHEAR RIGIDITY FOR K2=6

C PP1(M): POISSON'S RATIO FOR K2=4 & 5,

C CROSS AREA FOR K2=1-3, YOUNG'S MODULUS FOR K2=6

C HH1(M): 1.0 FOR K2=4 & 5, MOMENT OF INERTIA FOR K2=3

C POISSON'S RATIO FOR K2=6

C RO1(M): DENSITY

C CC1(M): COHESION, FA1(M):ANGLE OF SHEAR RESISTANCE

C DL1(M): ANGLE OF DILATANCY

C

 WRITE(6,213)

 DO 16 M=1,NMAT

 READ(5,107) M1,EE1(M),PP1(M),HH1(M),RO1(M),CC1(M),

 \* FA1(M),DL1(M)

 WRITE(6,107) M1,EE1(M),PP1(M),HH1(M),RO1(M),CC1(M),

 \* FA1(M),DL1(M)

 FA1(M)=FA1(M)\*3.14159D0/180.D0

 DL1(M)=DL1(M)\*3.14159D0/180.D0

 16 CONTINUE

C

 DO 18 L=1,NNE

 M=MAT(L)

 EE(L)=EE1(M)

 PP(L)=PP1(M)

 HH(L)=HH1(M)

 ROU(L)=RO1(M)

 CC(L)=CC1(M)

 FI=FA1(M)

 FAI(L)=FI\*180.D0/3.14159D0

 SFI(L)=DSIN(FI)

 CFI(L)=DCOS(FI)

 DL=DL1(M)

 DLT(L)=DL\*180.D0/3.14159D0

 SDL(L)=DSIN(DL)

 CDL(L)=DCOS(DL)

 N=K2(L)

 NET(N)=NET(N)+1

 IF(N.LE.3.OR.N.EQ.6) ROU(L)=0.D0

 18 CONTINUE

C \*\*\* ELEMENT TYPE

 WRITE(6,202) (NET(I),I=1,6)

C \*\*\* EMBANKMENT ELEMENTS

 NBA=0

 DO 20 L=1,NNE

 IB=IBA(L)

 IF(IB.EQ.0) GO TO 20

 NBA=NBA+1

 LBA(NBA)=L

 20 CONTINUE

 IF(NBA.LE.0) GO TO 22

 WRITE(6,203) NBA

 WRITE(6,101) (LBA(I),I=1,NBA)

 22 CONTINUE

C

 WRITE(6,205)

 DO 26 L=1,NNE

 IF(IPR.EQ.0) GO TO 26

 WRITE(6,206) L,(IJK(L,I),I=1,4),K2(L),EE(L),PP(L),HH(L),

 \* ROU(L),CC(L),FAI(L),DLT(L),IBA(L),IST(L),LRE(L)

 26 CONTINUE

C \*\*\* NODAL LOADS

 IF(NFL.EQ.0) GO TO 30

 READ(5,101) (IFL(I),I=1,NFL)

 READ(5,106) DELP,WID

 WRITE(6,207)

 IXY=2

 DO 32 I=1,NFL

 NOD=IFL(I)

 PRES=DELP

 FL=-PRES\*WID\*0.5

 IF(I.GE.2.AND.I.LT.NFL) FL=FL\*2.D0

 LOI(I)=3\*NOD-(3-IXY)

 FLO(I)=FL\*XX(NOD)

 32 CONTINUE

 30 CONTINUE

C \*\*\* ACTUALLY INITIAL STRESSES

C K1: SET NO., STII(K,I) I=1,2,3,4: SIGUMA-X,Y,TAU-XY,SIGUMA-Z

 DO 40 L=1,NNE

 DO 40 I=1,4

 STI(L,I)=0.D0

 40 PST(L,I)=0.D0

 IF(NIS.LE.0) GO TO 42

 WRITE(6,208)

 DO 44 K=1,NIS

 READ(5,105) K1,(STII(K,I),I=1,4)

 44 WRITE(6,105) K1,(STII(K,I),I=1,4)

 DO 46 L=1,NNE

 IF(K2(L).LE.3) GO TO 46

 K=IST(L)

 DO 48 I=1,4

 STI(L,I)=STII(K,I)

 48 PST(L,I)=STII(K,I)

 46 CONTINUE

 GO TO 50

 42 READ(5,101) IU

 WRITE(6,209) IU

 IF(IU.LE.0) GO TO 50

 DO 52 I=1,4

 READ(7,106) (PST(L,I),L=1,NNE)

 52 WRITE(6,106) (PST(L,I),L=1,NNE)

 50 CONTINUE

C \*\*\* CONVERGENCE CONSTANTS ETC.

C SCD: SCALING FACTOR FOR DISPLACEMENT OUTPUT

C ERC: CONV. CONST. FOR CONFINING PRESSURE

C FSS: SAFETY FACTOR FS

 READ(5,106) THB,GSB,SCC,ERR

 IF(SCC.LT.0.01D0) SCC=1.D0

 IF(THB.LT.0.001D0) THB=0.001D0

 WRITE(6,210) THB,GSB,SCC,ERR

C \*\*\* DISP. OUTPUT NODE

 READ(5,101) NDI

 WRITE(6,211) NDI

C

 100 FORMAT(15A4)

 101 FORMAT(15I5)

 102 FORMAT(I5,2F10.4,3I5)

 103 FORMAT(10I5)

 104 FORMAT(3I5,E12.3)

 105 FORMAT(I5,7E10.3)

 106 FORMAT(10E8.3)

 107 FORMAT(I5,7E10.3)

 108 FORMAT(10E8.3)

 200 FORMAT(/'NODES=',I5,' ELEMENTS=',I5,' MATERIALS=',I3

 \*/' LOADS=',I3,' INITIAL-STRESSES=',I3,' ITERATION=',I2

 \*/' TRYALS=',I3,' CRITICAL=',I2,' PRINT=',I2

 \*/' LOAD-STEPS=',I5,' ACTUAL STEPS=',I5,' M-AVS STEPS='I5

 \*/' M-AVS STEP NO.'/5X,10I5)

 201 FORMAT(/'NODAL DATA'/'NO.',9X,'X',9X,'Y',' X-F Y-F R-F')

 202 FORMAT(/'TRUSS=',I5,' BEAM=',I5,' TEXTILE=',I5,' P-STRA=',I5,

 \*/' P-STRA(NL)=',I5,' INTER=',I5)

 203 FORMAT(/'EMBANKMENT ELEMENTS=',I5)

 205 FORMAT(/'ELEMENT DATA'

 \*/'NO. NODES TYPE E P H ROH C FAI DEL EMB STRE SLIP')

 206 FORMAT(I4,4I5,I2,3E9.2,F6.2,F7.2,2F6.2,3I2)

 207 FORMAT(/'NODAL LOADS')

 208 FORMAT(/'ACTUALLY INITIAL STRESSES')

 209 FORMAT(/'INITIAL STRESSES 0=NO, 1=INPUT',I5)

 210 FORMAT(/' BAND THICKNESS=',F10.4

 \*/' MIN. SHEAR RIGIDITY=',F10.4,' DISP.SCALE=',F10.2

 \*/' CRITICAL CHECK=',F10.4)

 211 FORMAT(/'DISP. OUTPUT NODE=',I5)

 213 FORMAT(/'MATERIAL PARAMETERS'

 \*/' NO. E NYU H ROH C FAI DEL')

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE PREPAR(IND)

C \*\*\* SET DISPLACEMENT VECTOR AND STIFFNESS MATRIX

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 DIMENSION EML(1300)

C

 DO 10 L=1,NNP

 10 NDF(L)=2

 DO 12 L=1,NNE

 IF(K2(L).NE.2) GO TO 12

 I=IJK(L,1)

 J=IJK(L,2)

 NDF(I)=3

 NDF(J)=3

 12 CONTINUE

 DO 14 L=1,NNP

 LY(3\*L-2)=IX(L)

 LY(3\*L-1)=IY(L)

 IF(NDF(L).EQ.2) IQ(L)=1

 LY(3\*L)=IQ(L)

 14 CONTINUE

 NX=3\*NNP

 LOC=0

 DO 16 L=1,NX

 IF(LY(L).EQ.0) GO TO 18

 LY(L)=NN

 GO TO 16

 18 LOC=LOC+1

 LX(LOC)=L

 LY(L)=LOC

 16 CONTINUE

 NY=LOC

 WRITE(6,200) NY

 IF(NY.LT.NN) GO TO 20

 WRITE(6,201)

 IND=10

 RETURN

C

 20 DO 22 I=1,NY

 DO 22 J=1,NY

 22 GKK(I,J)=0.D0

 DO 24 L=1,NNE

 DO 24 I=1,8

 DO 24 J=1,8

 24 EKK(L,I,J)=0.D0

C

 DO 30 L=1,NNE

 KOL2=K2(L)

 GO TO (31,32,31,34,34,34),KOL2

 31 CALL TRUSS(L)

 GO TO 30

 32 CALL BEAM(L)

 GO TO 30

 34 CALL AXISYM(L,KOL2)

 30 CONTINUE

 CALL GSTIFF

C

 CALL DINV(GKK,NN,NY,0,DET,IND)

 IF(IND.EQ.1) GO TO 80

 WRITE(6,202) IND

 80 CONTINUE

C

 200 FORMAT(/'NUMBER OF VARIABLES=',I4)

 201 FORMAT(/'\* VARIABLE MEMORY=OVER')

 202 FORMAT(/'\* INDEX=',I3)

 203 FORMAT(/'EMBANK. LOAD'/(10F7.2))

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE GSTIFF

C \*\*\* GLOBAL STIFFNESS MATRIX

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

C

 DO 10 L=1,NNE

 KOL2=K2(L)

 GO TO (11,12,11,14,14,14),KOL2

 11 NV=4

 GO TO 20

 12 NV=6

 GO TO 20

 14 NV=8

 IF(IJK(L,4).EQ.0) NV=6

 20 CONTINUE

 DO 30 I=1,NV

 IT=LLL(L,I)

 IF(IT.EQ.NN) GO TO 30

 DO 32 J=1,NV

 JT=LLL(L,J)

 IF(JT.EQ.NN) GO TO 32

 GKK(IT,JT)=GKK(IT,JT)+EKK(L,I,J)

 32 CONTINUE

 30 CONTINUE

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE INISTR

C \*\*\* APPLY MODIFIED INITIAL STRESS METHOD

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 COMMON/LB21/PS1(1250),PS3(1250),QS1(1250),QS3(1250)

C

 NFAT=0

 NTS=0

 DO 2 L=1,NNE

 JFA(L)=0

 MFA(L)=0

 LFA(L)=0

 JTS(L)=0

 PS3(L)=0.D0

 QS3(L)=0.D0

 DO 4 I=1,4

 SST(L,I)=0.D0

 4 STAX(L,I)=0.D0

 2 CONTINUE

C

 DO 100 ITP=1,MSTP

 ISTP=ITP

 WRITE(6,200) ISTP

 CALL LOADVE(ISTP)

 DO 6 L=1,NNE

 DO 6 I=1,4

 6 ST0(L,I)=0.D0

C

 DO 110 ITT=1,NTRY

 WRITE(6,201) ITT

C

 CALL DISPLA

 CALL STRESS

 DO 10 I=1,NY

 10 QTU(I)=PTU(I)+TU(I)

 DO 12 L=1,NNE

 DO 14 I=1,4

 14 QST(L,I)=PST(L,I)+STR(L,I)

 12 CONTINUE

C IF(ITT.GE.2) CALL CALSTB(1)

 IF(ITT.EQ.NTRY) GO TO 302

 CALL YIELD(QST)

 IF(ITER.EQ.0) GO TO 302

 IF(ITT.EQ.1.AND.NFA.LE.0) GO TO 300

 IF(ITT.GE.2.AND.NFA.LE.0) GO TO 302

 WRITE(6,202) (IFA(I),I=1,NFA)

 CALL CALSTA

 DO 20 IE=1,NFA

 LI=IFA(IE)

 DO 22 I=1,4

 22 STAX(LI,I)=STA(IE,I)

 SX=STAX(LI,1)

 SY=STAX(LI,2)

 TA=STAX(LI,3)

 CALL PRINCE(SX,SY,TA,S1,S3,TH)

 PI3(LI)=TH

 20 CONTINUE

 CALL DEPMAT

 CALL YGRAD1

 300 CONTINUE

 IF(NFAT.LE.0) GO TO 302

 CALL CALSTC

 CALL NOTENS

 CALL YGRAD2

 110 CONTINUE

C

 302 CONTINUE

 CALL NOTENS

 CALL YGRAD2

 CALL DISPLA

 CALL STRESS

 DO 50 I=1,NY

 50 QTU(I)=PTU(I)+TU(I)

 DO 52 L=1,NNE

 DO 54 I=1,4

 54 QST(L,I)=PST(L,I)+STR(L,I)

 52 CONTINUE

 DO 24 L=1,NNE

 DO 24 I=1,4

 24 STB(L,I)=QST(L,I)

 IF(NFAT.LE.0) GO TO 304

 CALL CALSTB(1)

 304 CONTINUE

 CALL OUTPUT

C

 IF(NFAT.LE.0) GO TO 70

 IF(ICR.LE.0) GO TO 70

 DO 62 IL=1,NFAT

 LI=KFA(IL)

 IF(LFA(LI).GE.1) GO TO 62

 IF(ICR.EQ.2) GO TO 66

 SX=STB(LI,1)

 SY=STB(LI,2)

 TA=STB(LI,3)

 CALL PRINCE(SX,SY,TA,S1,S3,TH)

 QS1(LI)=S1

 QS3(LI)=S3

 DI=QS3(LI)-PS3(LI)

 IF(DABS(DI).GT.ERR) GO TO 62

 66 LFA(LI)=1

 CC(LI)=(S1-S3)\*.5D0

 SFI(LI)=0.D0

 CFI(LI)=1.D0

 SDL(LI)=0.D0

 CDL(LI)=1.D0

 62 CONTINUE

 DO 64 L=1,NNE

 64 PS3(L)=QS3(L)

 70 CONTINUE

C

 DO 26 L=1,NNE

 26 MFA(L)=JFA(L)

 DO 28 L=1,NNE

 DO 28 I=1,4

 28 SST(L,I)=PST(L,I)

 DO 32 L=1,NNE

 DO 32 I=1,4

 32 PST(L,I)=STB(L,I)

 DO 34 I=1,NY

 34 PTU(I)=QTU(I)

 100 CONTINUE

C

 200 FORMAT(/'\* LOADING STEP=',I5)

 201 FORMAT('STAGE',I3)

 202 FORMAT('NEW YIELD EL',10(/10I5))

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE LOADVE(ISTP)

C \*\*\* CALCULATE LOAD VECTOR

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 DIMENSION EML(1300)

C \*\*\* NODAL LOAD

 DO 10 I=1,NY

 FF(I)=0.D0

 10 TF(I)=0.D0

 DO 12 I=1,NFL

 IT=LOI(I)

 IT=LY(IT)

 TF(IT)=FLO(I)

 12 CONTINUE

 DO 31 I=1,NY

 FF(I)=0.D0

 DO 31 J=1,NY

 FF(I)=FF(I)+GKK(I,J)\*TF(J)

 31 CONTINUE

 40 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE DISPLA

C \*\*\* CALCULATE DISPLACEMENTS

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION TR(2600),FE(8),BT(8,4)

C

 DO 2 I=1,NY

 2 TR(I)=0.D0

 IF(NFAT.LE.0) GO TO 4

 DO 10 IL=1,NFAT

 LI=KFA(IL)

 KOL2=K2(LI)

 NV=8

 IF(IJK(LI,4).EQ.0) NV=6

 DO 12 I=1,NV

 DO 12 J=1,4

 BT(I,J)=0.D0

 DO 12 K=1,4

 12 BT(I,J)=BT(I,J)+BMX(LI,K,I)\*TMX(LI,K,J)

C

 NDY1=NDY

 IF(JTS(LI).GE.1.AND.NDY.EQ.3) NDY1=2

C

 DO 16 I=1,NV

 FE(I)=0.D0

 DO 16 J=NDY1,3

 16 FE(I)=FE(I)+BT(I,J)\*ST0(LI,J)

 A=AES(LI)

 DO 18 I=1,NV

 IT=LLL(LI,I)

 18 TR(IT)=TR(IT)+FE(I)\*A

 10 CONTINUE

 4 CONTINUE

C

 DO 40 I=1,NY

 40 TR(I)=TF(I)+TR(I)

 DO 42 I=1,NY

 TU(I)=0.D0

 DO 42 J=1,NY

 42 TU(I)=TU(I)+GKK(I,J)\*TR(J)

 TU(NN)=0.D0

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE STRESS

C \*\*\* CALCULATE STRESSES

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 DIMENSION EU(8)

C

 DO 10 L=1,NNE

 DO 20 I=1,6

 20 STR(L,I)=0.D0

 KOL2=K2(L)

 GO TO (11,12,11,14,14,14),KOL2

C \*\*\* TRUSS & TEXTILE

 11 DO 22 I=1,4

 IT=LLL(L,I)

 22 EU(I)=TU(IT)

 E=EE(L)

 STR(L,1)=0.D0

 DO 24 I=1,4

 24 STR(L,1)=STR(L,1)+BMX(L,1,I)\*EU(I)\*E

 GO TO 10

C \*\*\* BEAM

 12 DO 26 I=1,6

 IT=LLL(L,I)

 26 EU(I)=TU(IT)

 DO 28 I=1,6

 STR(L,I)=0.D0

 DO 28 J=1,6

 28 STR(L,I)=STR(L,I)+DBM(L,I,J)\*EU(J)

 GO TO 10

C \*\*\* AXI-SYMMETRIC

 14 NV=8

 IF(IJK(L,4).EQ.0) NV=6

 DO 30 I=1,NV

 IT=LLL(L,I)

 30 EU(I)=TU(IT)

 DO 32 I=1,4

 EPS(L,I)=0.D0

 DO 32 J=1,NV

 32 EPS(L,I)=EPS(L,I)+BMX(L,I,J)\*EU(J)

 DO 34 I=1,4

 STR(L,I)=0.D0

 DO 34 J=1,NV

 STR(L,I)=STR(L,I)+DBM(L,I,J)\*EU(J)

 34 CONTINUE

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE YIELD(RST)

C \*\*\* FIND YIELD ELEMENTS

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 DIMENSION RST(1250,4),RRS(4),DST(4)

C

 IL=0

 IM=0

 DO 10 L=1,NNE

 KOL2=K2(L)

 GO TO (10,10,10,14,14,16),KOL2

 14 SX=RST(L,1)

 SY=RST(L,2)

 TA=RST(L,3)

 CALL MOHRCO(L,SX,SY,TA,F,S,P2,B0)

 GO TO 20

 16 SG=RST(L,2)

 TA=RST(L,3)

 CALL COULOM(L,SG,TA,F,S,0)

 20 PI2(L)=S

 IF(MFA(L).GE.1) GO TO 30

 IF(F) 22,24,24

 22 JFA(L)=0

 GO TO 10

 24 IF(JFA(L).GE.1) GO TO 30

 IM=IM+1

 IFA(IM)=L

 IFS(L)=ISTP

 30 IL=IL+1

 JFA(L)=IL

 KFA(IL)=L

 10 CONTINUE

 NFA=IM

 NFAT=IL

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE CALSTA

C \*\*\* CALCULATE YIELD STRESSES SIGUMA-A

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 DIMENSION STD(4),RST(4),TST(4),AVECT(4),DST(4)

C

 DO 10 IE=1,NFA

 LI=IFA(IE)

 DO 2 I=1,4

 RST(I)=QST(LI,I)

 2 TST(I)=PST(LI,I)

 DO 4 I=1,4

 4 STD(I)=RST(I)-TST(I)

C

 KOL2=K2(LI)

 GO TO (10,10,10,14,14,16),KOL2

 14 SX=RST(1)

 SY=RST(2)

 TA=RST(3)

 CALL MOHRCO(LI,SX,SY,TA,F1,S,P2,B0)

 SX=TST(1)

 SY=TST(2)

 TA=TST(3)

 CALL MOHRCO(LI,SX,SY,TA,F0,S,P2,B0)

 IF(F0.LE.0.D0) GO TO 20

 F1=F0

 DO 22 I=1,4

 RST(I)=PST(LI,I)

 22 TST(I)=SST(LI,I)

 DO 24 I=1,4

 24 STD(I)=RST(I)-TST(I)

 SX=TST(1)

 SY=TST(2)

 TA=TST(3)

 CALL MOHRCO(LI,SX,SY,TA,F0,S,P2,B0)

 20 C1=-F0/(F1-F0)

 SX=TST(1)+STD(1)\*C1

 SY=TST(2)+STD(2)\*C1

 TA=TST(3)+STD(3)\*C1

 CALL MOHRCO(LI,SX,SY,TA,F2,S,P2,B0)

 B2=B0\*\*(-.5D0)

 SF=SFI(LI)

 A1=B2\*P2-SF

 A2=B2\*P2\*(-1.D0)-SF

 A3=B2\*4.D0\*TA

 R=A1\*STD(1)+A2\*STD(2)+A3\*STD(3)

 IF(R.EQ.0.D0) R=0.0001D0

 C=C1-F2/R

C IF(C.GT.1.) C=C1

 GO TO 18

 16 SG=RST(2)

 TA=RST(3)

 CALL COULOM(LI,SG,TA,F1,S,1)

 SG=TST(2)

 TA=TST(3)

 CALL COULOM(LI,SG,TA,F0,S,1)

 IF(F0.LE.0.D0) GO TO 30

 F1=F0

 DO 32 I=1,4

 RST(I)=PST(LI,I)

 32 TST(I)=SST(LI,I)

 DO 34 I=1,4

 34 STD(I)=RST(I)-TST(I)

 SG=TST(2)

 TA=TST(3)

 CALL COULOM(LI,SG,TA,F0,S,1)

 30 C=-F0/(F1-F0)

 18 CONTINUE

 DO 50 I=1,4

 50 STA(IE,I)=TST(I)+STD(I)\*C

C

 GO TO (10,10,10,54,54,56),KOL2

 54 SX=STA(IE,1)

 SY=STA(IE,2)

 TA=STA(IE,3)

 CALL MOHRCO(LI,SX,SY,TA,F,S,P2,B0)

 GO TO 58

 56 SG=STA(IE,2)

 TA=STA(IE,3)

 CALL COULOM(LI,SG,TA,F,S,0)

 58 PI1(LI)=S

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE CALSTB(IC)

C \*\*\* CALCULATE CURRENT STRESSES SIGUMA-B

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION SBD(1250,4),QSD(1250,4),SAD(1250,4),S0D(1250,4)

 DIMENSION DP(4),STD(4)

C

 DO 10 IL=1,NFAT

 LI=KFA(IL)

 DO 14 I=1,4

 DP(I)=0.D0

 DO 14 J=1,4

 14 DP(I)=DP(I)+TMX(LI,I,J)\*ST0(LI,J)

 DO 16 I=1,4

 16 STB(LI,I)=QST(LI,I)-DP(I)

 10 CONTINUE

C

 IF(IC.LE.0) GO TO 80

 80 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE CALSTC

C \*\*\* CALCULATE PRECEDING STRESSES SIGUMA-C

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

C

 DO 10 IL=1,NFAT

 LI=KFA(IL)

 DO 12 I=1,4

 12 EPE(LI,I)=0.D0

C

 IS=IFS(LI)-ISTP

 IF(IS) 20,22,22

 20 DO 14 I=1,4

 14 STC(LI,I)=PST(LI,I)

 GO TO 10

 22 DO 16 I=1,4

 EPE(LI,I)=0.D0

 DO 16 J=1,4

 16 EPE(LI,I)=EPE(LI,I)+DIX(LI,I,J)\*(STAX(LI,J)-PST(LI,J))

 DO 18 I=1,4

 18 STC(LI,I)=STAX(LI,I)

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE DEPMAT

C \*\*\* CALCULATE DEP-MATRIX

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 DIMENSION T(4,4),D(4,4),TD(4,4),DPF(4,4)

C

 DO 10 IE=1,NFA

 LI=IFA(IE)

 KOL2=K2(LI)

C

 GO TO (10,10,10,10,15,16),KOL2

 15 SI=1.D0

 IF(LRE(LI).GE.2) SI=-1.D0

 E=EE(LI)

 P=PP(LI)

 G=E/(2.D0\*(1.+P))

 GO TO 18

 16 SI=-1.D0

 IF(STR(LI,3).LT.0.D0) SI=1.D0

 E=PP(LI)

 P=HH(LI)

 G=EE(LI)

 18 IF(ICR.LE.1) GO TO 12

C

 SIT=PI3(LI)

 TFI=SFI(LI)/CFI(LI)

 TDL=SDL(LI)/CDL(LI)

 ALF=3.14159\*0.25+ATAN(TFI)\*0.5

 BET=(ALF+SIT)\*(-1.)

 IF(LRE(LI).GE.2) BET=ALF-SIT

 PI4(LI)=BET

 IF(KOL2.EQ.6) PI4(LI)=TIN(LI)

C

 IF(ICR.LE.1) GO TO 12

 TFI=0.

 TDL=0.

 12 CONTINUE

 IF(KOL2.EQ.6) GO TO 20

 CB=DCOS(BET)

 SB=DSIN(BET)

 T(1,1)=CB\*CB

 T(1,2)=SB\*SB

 T(1,3)=-2.D0\*SB\*CB

 T(1,4)=0.D0

 T(2,1)=SB\*SB

 T(2,2)=CB\*CB

 T(2,3)=2.D0\*SB\*CB

 T(2,4)=0.D0

 T(3,1)=SB\*CB

 T(3,2)=-SB\*CB

 T(3,3)=CB\*CB-SB\*SB

 T(3,4)=0.D0

 T(4,1)=0.D0

 T(4,2)=0.D0

 T(4,3)=0.D0

 T(4,4)=1.D0

 DO 22 I=1,4

 DO 22 J=1,4

 22 TMX(LI,I,J)=T(I,J)

 CALL DINV(T,4,4,0,DET,IND)

 DO 24 I=1,4

 DO 24 J=1,4

 24 TMI(LI,I,J)=T(I,J)

 DO 26 I=1,4

 DO 26 J=1,4

 26 T(I,J)=TMX(LI,I,J)

C

 20 C1=E\*(1.D0-P)/((1.D0+P)\*(1.D0-2.D0\*P))

 C2=E\*P/((1.D0+P)\*(1.D0-2.D0\*P))

 B1=1.D0/(C1\*TFI\*TDL+G)

 DPF(1,1)=C1

 DPF(1,2)=C2

 DPF(1,3)=0.D0

 DPF(1,4)=C2

 DPF(2,1)=C2

 DPF(2,2)=C1

 DPF(2,3)=0.D0

 DPF(2,4)=C2

 DPF(3,1)=-SI\*C2\*TFI

 DPF(3,2)=-SI\*C1\*TFI

 DPF(3,3)=0.D0

 DPF(3,4)=-SI\*C2\*TFI

 DPF(4,1)=C2

 DPF(4,2)=C2

 DPF(4,3)=0.D0

 DPF(4,4)=C1

C

 IF(KOL2.EQ.6) GO TO 40

 50 CALL MULT(T,DPF,TD,4,4,4)

 CALL XULT(TD,T,DPF,4,4,4)

 40 DO 44 I=1,4

 DO 44 J=1,4

 44 DEP(LI,I,J)=DPF(I,J)

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE NOTENS

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION STD(4),TQS(4),TST(4)

C

 IT=0

 DO 10 IL=1,NFAT

 LI=KFA(IL)

 JTS(LI)=0

 KOL2=K2(LI)

 GO TO (10,10,13,10,15,15),KOL2

 13 SG=STR(LI,1)

 IF(SG.LE.0.D0) GO TO 10

 GO TO 18

 15 DO 20 I=1,4

 STD(I)=0.D0

 DO 20 J=1,4

 20 STD(I)=STD(I)+TMI(LI,I,J)\*(QST(LI,J)-STC(LI,J))

 IF(STD(2).GE.0.D0) GO TO 10

 18 IT=IT+1

 ITS(IT)=LI

 JTS(LI)=IT

 10 CONTINUE

 NTS=IT

C IF(NTS.LE.0) GO TO 80

C WRITE(6,200) (ITS(I),I=1,NTS)

C 200 FORMAT(10I5)

 80 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE YGRAD1

C \*\*\* CALCULATE 'INITIAL STRESSES' (STEP-1)

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 DIMENSION TR(2600),FE(8),GU(2600),BT(8,4)

C

 DO 10 IE=1,NFA

 LI=IFA(IE)

 KOL2=K2(LI)

 NV=8

 IF(IJK(LI,4).EQ.0) NV=6

 IF(KOL2.EQ.6) GO TO 40

 DO 12 I=1,NV

 DO 12 J=1,4

 BT(I,J)=0.D0

 DO 12 K=1,4

 12 BT(I,J)=BT(I,J)+BMX(LI,K,I)\*TMX(LI,K,J)

 GO TO 50

 40 DO 41 I=1,NV

 DO 41 J=1,4

 41 BT(I,J)=0.D0

 DO 42 I=1,NV

 DO 42 J=1,4

 42 BT(I,J)=BMX(LI,J,I)

 50 A=AES(LI)

C

 NDY1=NDY

 IF(NDY.EQ.3) NDY1=2

 DO 20 II=NDY1,3

 DO 22 I=1,NY

 22 TR(I)=0.D0

 DO 24 I=1,NV

 24 FE(I)=BT(I,II)

 DO 26 I=1,NV

 IT=LLL(LI,I)

 26 TR(IT)=TR(IT)+FE(I)\*A

 DO 28 I=1,NY

 GU(I)=0.D0

 DO 28 J=1,NY

 28 GU(I)=GU(I)+GKK(I,J)\*TR(J)

C

 DO 30 I=1,NY

 30 GG1(LI,II,I)=GU(I)

 GG1(LI,II,NN)=0.D0

 20 CONTINUE

 10 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE YGRAD2

C \*\*\* CALCULATE 'INITIAL STRESSES' (STEP-2)

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB16/DEP(1250,4,4),GG1(1250,4,2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION EU(8),EP(4),FP(4),DM(4,4),RF(2600),

 \* AA(2150,2150),SL0(2600)

C

 NVS=NFAT+NTS

 IF(NVS.LE.NVM) GO TO 5

 WRITE(6,200) NVS

 STOP

 5 CONTINUE

C

 DO 10 IL=1,NVS

 LI=KFA(IL)

 II=3

 IF(IL.GT.NFAT) LI=ITS(IL-NFAT)

 IF(IL.GT.NFAT) II=2

 NVI=8

 IF(IJK(LI,4).EQ.0) NVI=6

C

 DO 20 JL=1,NVS

 LJ=KFA(JL)

 IJ=3

 IF(JL.GT.NFAT) LJ=ITS(JL-NFAT)

 IF(JL.GT.NFAT) IJ=2

 DO 22 I=1,NVI

 IT=LLL(LI,I)

 22 EU(I)=GG1(LJ,IJ,IT)

 DO 24 I=1,4

 EP(I)=0.D0

 DO 24 J=1,NVI

 24 EP(I)=EP(I)+BMX(LI,I,J)\*EU(J)

 IF(IL-NFAT) 25,25,27

 25 IF(JTS(LI).GE.1) GO TO 27

 DO 26 I=1,4

 DO 26 J=1,4

 26 DM(I,J)=DMX(LI,I,J)-DEP(LI,I,J)

 GO TO 29

 27 DO 28 I=1,4

 DO 28 J=1,4

 28 DM(I,J)=DMX(LI,I,J)

 29 DO 30 I=1,4

 FP(I)=0.D0

 DO 30 J=1,4

 30 FP(I)=FP(I)+DM(I,J)\*EP(J)

 DO 32 I=1,4

 EP(I)=0.D0

 DO 32 J=1,4

 32 EP(I)=EP(I)+TMI(LI,I,J)\*FP(J)

C

 C1=0.D0

 IF(LJ.EQ.LI.AND.IJ.EQ.II) C1=1.D0

 AA(IL,JL)=C1-EP(II)

 20 CONTINUE

 10 CONTINUE

C

 DO 50 JL=1,NVS

 LJ=KFA(JL)

 IF(JL.GT.NFAT) LJ=ITS(JL-NFAT)

 NV=8

 IF(IJK(LJ,4).EQ.0) NV=6

 DO 52 I=1,NV

 IT=LLL(LJ,I)

 52 EU(I)=FF(IT)

 DO 54 I=1,4

 EP(I)=0.D0

 DO 54 J=1,NV

 54 EP(I)=EP(I)+BMX(LJ,I,J)\*EU(J)

 IF(JL-NFAT) 55,55,57

 55 IF(JTS(LJ).GE.1) GO TO 57

 DO 56 I=1,4

 DO 56 J=1,4

 56 DM(I,J)=DMX(LJ,I,J)-DEP(LJ,I,J)

 GO TO 59

 57 DO 58 I=1,4

 DO 58 J=1,4

 58 DM(I,J)=DMX(LJ,I,J)

 59 DO 60 I=1,4

 FP(I)=0.D0

 DO 60 J=1,4

 60 FP(I)=FP(I)+DM(I,J)\*EP(J)

 DO 62 I=1,4

 EP(I)=0.D0

 DO 62 J=1,4

 62 EP(I)=EP(I)+TMI(LJ,I,J)\*FP(J)

C

 IJ=3

 IF(JL.GT.NFAT) IJ=2

 RF(JL)=EP(IJ)

 50 CONTINUE

C

 DO 70 JL=1,NVS

 LJ=KFA(JL)

 IF(JL.GT.NFAT) LJ=ITS(JL-NFAT)

 IF(JL-NFAT) 71,71,73

 71 IF(JTS(LJ).GE.1) GO TO 73

 DO 72 I=1,4

 DO 72 J=1,4

 72 DM(I,J)=DMX(LJ,I,J)-DEP(LJ,I,J)

 GO TO 75

 73 DO 74 I=1,4

 DO 74 J=1,4

 74 DM(I,J)=DMX(LJ,I,J)

 75 DO 76 I=1,4

 FP(I)=0.D0

 DO 76 J=1,4

 76 FP(I)=FP(I)+DM(I,J)\*EPE(LJ,J)

 DO 78 I=1,4

 EP(I)=0.D0

 DO 78 J=1,4

 78 EP(I)=EP(I)+TMI(LJ,I,J)\*FP(J)

C

 IJ=3

 IF(JL.GT.NFAT) IJ=2

 RF(JL)=RF(JL)-EP(IJ)

 70 CONTINUE

C

 CALL GAUSSZ(AA,RF,NVM,NVS)

C

 DO 82 JL=1,NFAT

 LJ=KFA(JL)

 ST0(LJ,2)=0.D0

 82 CONTINUE

 DO 84 JL=1,NVS

 LJ=KFA(JL)

 IJ=3

 IF(JL.GT.NFAT) LJ=ITS(JL-NFAT)

 IF(JL.GT.NFAT) IJ=2

 ST0(LJ,IJ)=RF(JL)

 84 CONTINUE

 200 FORMAT(/'\* NUMBER OF INITIAL STRESSES IS OVER',I5)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE MOHRCO(L,SX,SY,TA,F,S,P2,B0)

C \*\*\* MOHR-COULOMB YIELD CONDITION

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 P1=.5D0\*(SX+SY)

 P2=SX-SY

 B0=P2\*P2+4.D0\*TA\*TA

 S1=P1+.5D0\*DSQRT(B0)

 S3=P1-.5D0\*DSQRT(B0)

 A1=(S1+S3)\*SFI(L)+2.D0\*CC(L)\*CFI(L)

 B1=S1-S3

 F=B1-A1

 S=A1/B1

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE COULOM(L,SG,TA,F,S,IC)

C \*\*\* COULOMB YIELD CONDITION

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 ST=CC(L)+SG\*SFI(L)/CFI(L)

 IF(IC.LE.0) ST=VFUNC(ST)

 TA=DABS(TA)

 F=TA-ST

 S=0.D0

 IF(TA.GT.0.001D0) S=ST/TA

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE TRUSS(L)

C \*\*\* TRUSS ELEMENT

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 DIMENSION LL(4),BM(4),EK(4,4),T(4,4),TEK(4,4),TET(4,4)

C

 II=IJK(L,1)

 JJ=IJK(L,2)

C

 E=EE(L)

 A=PP(L)

 XI=XX(II)

 YI=YY(II)

 XJ=XX(JJ)

 YJ=YY(JJ)

 DX=XJ-XI

 DY=YJ-YI

 EL=DSQRT(DX\*DX+DY\*DY)

 C=DX/EL

 S=DY/EL

 BM(1)=1.D0/EL

 BM(2)=0.D0

 BM(3)=-1.D0/EL

 BM(4)=0.D0

 DO 2 I=1,4

 DO 2 J=1,4

 2 EK(I,J)=BM(I)\*BM(J)\*E\*EL\*A

C

 DO 4 I=1,4

 DO 4 J=1,4

 4 T(I,J)=0.D0

 T(1,1)=C

 T(1,2)=S

 T(2,1)=-S

 T(2,2)=C

 T(3,3)=C

 T(3,4)=S

 T(4,3)=-S

 T(4,4)=C

 CALL WULT(T,EK,TEK,4,4,4)

 CALL MULT(TEK,T,TET,4,4,4)

 DO 10 I=1,4

 DO 10 J=1,4

 EKK(L,I,J)=TET(I,J)

 10 CONTINUE

C

 AES(L)=A\*EL

 DO 6 J=1,4

 BMX(L,1,J)=0.D0

 DO 6 K=1,4

 6 BMX(L,1,J)=BMX(L,1,J)+BM(K)\*T(K,J)

 DBM(L,1,1)=E\*EL

 LL(4)=3\*JJ-1

 LL(3)=LL(4)-1

 LL(2)=3\*II-1

 LL(1)=LL(2)-1

 DO 8 I=1,4

 IT=LL(I)

 8 LLL(L,I)=LY(IT)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE BEAM(L)

C \*\*\* BEAM (RAHMEN) ELEMENT

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 DIMENSION LL(10),EK(6,6),T(6,6),TEK(6,6),TET(6,6),EKT(6,6)

C

 II=IJK(L,1)

 JJ=IJK(L,2)

C

 E=EE(L)

 A=PP(L)

 AI=HH(L)

 XI=XX(II)

 YI=YY(II)

 XJ=XX(JJ)

 YJ=YY(JJ)

 DX=XJ-XI

 DY=YJ-YI

 EL=DSQRT(DX\*DX+DY\*DY)

 C=DX/EL

 S=DY/EL

 G=E\*A/EL

 G5=2.D0\*E\*AI/EL

 G4=2.D0\*G5

 G3=3.D0\*G5/EL

 G2=2.D0\*G3/EL

C

 DO 2 I=1,6

 DO 2 J=1,6

 T(I,J)=0.D0

 EK(I,J)=0.D0

 2 CONTINUE

 EK(1,1)=G

 EK(2,2)=G2

 EK(3,3)=G4

 EK(4,4)=G

 EK(5,5)=G2

 EK(6,6)=G4

 EK(1,4)=-G

 EK(2,3)=G3

 EK(2,5)=-G2

 EK(2,6)=G3

 EK(3,5)=-G3

 EK(3,6)=G5

 EK(5,6)=-G3

 DO 4 I=1,5

 IP1=I+1

 DO 6 J=IP1,6

 6 EK(J,I)=EK(I,J)

 4 CONTINUE

 DO 8 K=1,4,3

 T(K,K)=C

 T(K,K+1)=S

 T(K+1,K)=-S

 T(K+1,K+1)=C

 T(K+2,K+2)=1.D0

 8 CONTINUE

 CALL WULT(T,EK,TEK,6,6,6)

 CALL MULT(TEK,T,TET,6,6,6)

 CALL MULT(EK,T,EKT,6,6,6)

 DO 10 I=1,6

 DO 10 J=1,6

 DBM(L,I,J)=EKT(I,J)

 EKK(L,I,J)=TET(I,J)

 10 CONTINUE

C

 LL(6)=3\*JJ

 LL(5)=LL(6)-1

 LL(4)=LL(5)-1

 LL(3)=3\*II

 LL(2)=LL(3)-1

 LL(1)=LL(2)-1

 DO 12 I=1,6

 IT=LL(I)

 12 LLL(L,I)=LY(IT)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE AXISYM(L,KOL2)

C \*\*\* AXI-SYMMETRIC ELEMENT

 IMPLICIT REAL\*8(A-H,O-Z)

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB3/STR(1250,6),EPS(1250,4),FLO(60),EKK(1250,8,8)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB18/TMX(1250,4,4),TMI(1250,4,4),TIN(1250)

 DIMENSION LL(10),D(4,4),ES(8,8),IOE(6),B(4,6),DB(4,6),

 \* EK(6,6),BM(4,8),BMT(4,8),T(8,8),TEK(8,8),XXL(4),YYL(4),

 \* COR(8),COD(8),TM(4,4)

C

 II=IJK(L,1)

 JJ=IJK(L,2)

 KK=IJK(L,3)

 MM=IJK(L,4)

C

 DO 2 I=1,4

 DO 2 J=1,4

 2 D(I,J)=0.D0

C

 E=EE(L)

 P=PP(L)

 H=HH(L)

 GO TO (80,80,80,14,14,16),KOL2

 14 CONTINUE

 GP=1.D0+P

 GM=1.D0-P

 GN=1.D0-2.D0\*P

 G=E\*GM/(GP\*GN)

 G1=G\*P/GM

 G2=G\*GN\*0.5D0/GM

 D(1,1)=G

 D(2,2)=G

 D(3,3)=G2

 D(4,4)=G

 D(1,2)=G1

 D(1,4)=G1

 D(2,4)=G1

 D(2,1)=D(1,2)

 D(4,1)=D(1,4)

 D(4,2)=D(2,4)

 GO TO 18

 16 CONTINUE

 GP=1.D0+H

 GM=1.D0-H

 GN=1.D0-2.D0\*H

 G=P/(GP\*GN)

 G1=GM\*G

 G2=H\*G

 D(1,1)=G1

 D(2,2)=G1

 D(3,3)=E

 D(4,4)=G1

 D(1,2)=G2

 D(1,4)=G2

 D(2,4)=G2

 D(2,1)=D(1,2)

 D(4,1)=D(1,4)

 D(4,2)=D(2,4)

C

 DO 4 I=1,4

 DO 4 J=1,4

 4 TM(I,J)=0.D0

 DO 6 I=1,4

 6 TM(I,I)=1.D0

 DO 8 I=1,4

 DO 8 J=1,4

 8 TMX(L,I,J)=TM(I,J)

 DO 10 I=1,4

 DO 10 J=1,4

 10 TMI(L,I,J)=TM(I,J)

C

 DX=XX(JJ)-XX(II)

 DY=YY(JJ)-YY(II)

 EL=DSQRT(DX\*DX+DY\*DY)

 C=DX/EL

 S=DY/EL

 DO 20 I=1,8

 DO 20 J=1,8

 20 T(I,J)=0.D0

 DO 22 I=1,7,2

 T(I,I)=C

 T(I,I+1)=S

 T(I+1,I)=-S

 T(I+1,I+1)=C

 22 CONTINUE

 TA=S/C

 TIN(L)=DATAN(TA)

 COR(1)=XX(II)

 COR(2)=YY(II)

 COR(3)=XX(JJ)

 COR(4)=YY(JJ)

 COR(5)=XX(KK)

 COR(6)=YY(KK)

 COR(7)=XX(MM)

 COR(8)=YY(MM)

 DO 24 I=1,8

 COD(I)=0.D0

 DO 24 J=1,8

 24 COD(I)=COD(I)+T(I,J)\*COR(J)

 DO 26 I=1,4

 IE=2\*I

 IO=IE-1

 XXL(I)=COD(IO)

 YYL(I)=COD(IE)

 26 CONTINUE

C

 18 CONTINUE

 DO 30 I=1,4

 DO 30 J=1,6

 30 B(I,J)=0.D0

 DO 32 I=1,8

 DO 32 J=1,8

 32 ES(I,J)=0.D0

 DO 34 I=1,4

 DO 34 J=1,8

 34 BMT(I,J)=0.D0

 AE=0.D0

 I1=0

 I2=1

 I3=2

 N4=4

 NV=8

 IF(MM.EQ.0) N4=1

 IF(MM.EQ.0) NV=6

 DO 40 LI=1,N4

 I1=I1+1

 I2=I2+1

 IF(I2.EQ.5) I2=1

 I3=I3+1

 IF(I3.EQ.5) I3=1

 I1E=2\*I1

 I1O=I1E-1

 I2E=2\*I2

 I2O=I2E-1

 I3E=2\*I3

 I3O=I3E-1

 IOE(1)=I1O

 IOE(2)=I1E

 IOE(3)=I2O

 IOE(4)=I2E

 IOE(5)=I3O

 IOE(6)=I3E

 GO TO (80,80,80,44,44,46),KOL2

 44 CONTINUE

 IIT=IJK(L,I1)

 JJT=IJK(L,I2)

 KKT=IJK(L,I3)

 XI=XX(IIT)

 YI=YY(IIT)

 XJ=XX(JJT)

 YJ=YY(JJT)

 XK=XX(KKT)

 YK=YY(KKT)

 GO TO 48

 46 CONTINUE

 XI=XXL(I1)

 YI=YYL(I1)

 XJ=XXL(I2)

 YJ=YYL(I2)

 XK=XXL(I3)

 YK=YYL(I3)

 48 CONTINUE

 RR=(XI+XJ+XK)/3.D0

 ZZ=(YI+YJ+YK)/3.D0

 AI=XJ\*YK-XK\*YJ

 AJ=XK\*YI-XI\*YK

 AK=XI\*YJ-XJ\*YI

 BI=YJ-YK

 BJ=YK-YI

 BK=YI-YJ

 CI=XK-XJ

 CJ=XI-XK

 CK=XJ-XI

 DA=(AI+AJ+AK)\*0.5D0

 AE4=DABS(DA)\*RR

 AE=AE+AE4\*0.5D0

 D2=0.125D0/DA

 IF(MM.EQ.0) D2=0.5D0/DA

 BMT(3,I1E)=BMT(3,I1E)-BI\*D2

 BMT(3,I1O)=BMT(3,I1O)-CI\*D2

 BMT(3,I2E)=BMT(3,I2E)-BJ\*D2

 BMT(3,I2O)=BMT(3,I2O)-CJ\*D2

 BMT(3,I3E)=BMT(3,I3E)-BK\*D2

 BMT(3,I3O)=BMT(3,I3O)-CK\*D2

 BMT(4,I1O)=BMT(4,I1O)-(AI/RR+BI+CI\*ZZ/RR)\*D2

 BMT(4,I2O)=BMT(4,I2O)-(AJ/RR+BJ+CJ\*ZZ/RR)\*D2

 BMT(4,I3O)=BMT(4,I3O)-(AK/RR+BK+CK\*ZZ/RR)\*D2

C

 DEL2=1.D0/(AI+AJ+AK)

 B(3,1)=-CI\*DEL2

 B(3,2)=-BI\*DEL2

 B(3,3)=-CJ\*DEL2

 B(3,4)=-BJ\*DEL2

 B(3,5)=-CK\*DEL2

 B(3,6)=-BK\*DEL2

 B(4,1)=-(AI/RR+BI+CI\*ZZ/RR)\*DEL2

 B(4,3)=-(AJ/RR+BJ+CJ\*ZZ/RR)\*DEL2

 B(4,5)=-(AK/RR+BK+CK\*ZZ/RR)\*DEL2

 DO 50 I=1,3

 IE=2\*I

 IO=IE-1

 B(1,IO)=B(3,IE)

 B(2,IE)=B(3,IO)

 50 CONTINUE

 CALL MULT(D,B,DB,4,4,6)

 CALL WULT(B,DB,EK,6,4,6)

 DO 52 I=1,6

 IE=IOE(I)

 DO 54 J=1,6

 JE=IOE(J)

 ES(IE,JE)=ES(IE,JE)+EK(I,J)

 54 CONTINUE

 52 CONTINUE

 40 CONTINUE

C

 IF(MM.EQ.0) AE=DABS(DA)

 AES(L)=AE

 GO TO (80,80,80,64,64,66),KOL2

 64 CONTINUE

 C1=0.25D0

 IF(MM.EQ.0) C1=1.D0

 DO 70 I=1,NV

 DO 70 J=1,NV

 70 EKK(L,I,J)=ES(I,J)\*AE\*C1

 DO 72 I=1,2

 DO 72 J=1,NV

 72 BMX(L,I,J)=0.D0

 DO 74 J=1,NV

 BMX(L,3,J)=BMT(3,J)

 74 BMX(L,4,J)=BMT(4,J)

 N1=NV/2

 DO 76 J=1,N1

 JE=2\*J

 JO=JE-1

 BMX(L,1,JO)=BMX(L,3,JE)

 76 BMX(L,2,JE)=BMX(L,3,JO)

 GO TO 68

 66 CONTINUE

 CALL WULT(T,ES,TEK,8,8,8)

 CALL MULT(TEK,T,ES,8,8,8)

 DO 78 I=1,8

 DO 78 J=1,8

 78 EKK(L,I,J)=ES(I,J)\*AES(L)\*0.25D0

 DO 90 I=1,4

 DO 90 J=1,8

 90 BM(I,J)=0.D0

 DO 92 J=1,8

 BM(3,J)=BMT(3,J)

 92 BM(4,J)=BMT(4,J)

 DO 94 J=1,4

 JE=2\*J

 JO=JE-1

 BM(1,JO)=BM(3,JE)

 BM(2,JE)=BM(3,JO)

 94 CONTINUE

 DO 96 I=1,4

 DO 96 J=1,8

 BMX(L,I,J)=0.D0

 DO 96 K=1,8

 96 BMX(L,I,J)=BMX(L,I,J)+BM(I,K)\*T(K,J)

 68 CONTINUE

 LL(8)=3\*MM-1

 LL(7)=LL(8)-1

 LL(6)=3\*KK-1

 LL(5)=LL(6)-1

 LL(4)=3\*JJ-1

 LL(3)=LL(4)-1

 LL(2)=3\*II-1

 LL(1)=LL(2)-1

 DO 98 I=1,NV

 IT=LL(I)

 98 LLL(L,I)=LY(IT)

 DO 100 I=1,4

 DO 100 J=1,NV

 DBM(L,I,J)=0.D0

 DO 100 K=1,4

 100 DBM(L,I,J)=DBM(L,I,J)+D(I,K)\*BMX(L,K,J)

 DO 102 I=1,4

 DO 102 J=1,4

 102 DMX(L,I,J)=D(I,J)

 CALL DINV(D,4,4,0,DET,IND)

 DO 104 I=1,4

 DO 104 J=1,4

 104 DIX(L,I,J)=D(I,J)

 80 CONTINUE

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE DINV(AA,N0,N1,N2,DET,IND)

C \*\*\* INVERCE MATRIX

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION AA(N0,N0),IPERM(2600),X(2600)

 N=N1

 M=N+N2

 NMX=N0+1

 IF(0.GE.N.OR.N2.LT.0.OR.N.GE.NMX.OR.M.GE.NMX) GO TO 80

 IND=1

 DO 1 I=1,N

 1 IPERM(I)=I

 EPS=0.D0

 DO 2 K=1,N

 RMAX=0.D0

 DO 3 J=K,N

 V=DABS(AA(K,J))

 IF(RMAX-V) 4,3,3

 4 RMAX=V

 L=J

 3 CONTINUE

 IF(EPS-RMAX) 5,6,6

 6 IF(EPS\*0.01D0-RMAX) 7,8,8

 8 DET=0.D0

 IND=3

 DO 9 I=1,N

 DO 9 J=1,N

 9 AA(I,J)=1.0038D0

 WRITE(6,200)

 GO TO 11

 7 IND=2

 5 PIVOT=AA(K,L)

 PIVI=1.D0/PIVOT

 IF(L-K) 12,13,12

 12 IW=IPERM(K)

 IPERM(K)=IPERM(L)

 IPERM(L)=IW

 DO 14 I=1,N

 W=AA(I,K)

 AA(I,K)=AA(I,L)

 AA(I,L)=W

 14 CONTINUE

 13 CONTINUE

 DO 15 J=1,M

 X(J)=AA(K,J)\*PIVI

 AA(K,J)=X(J)

 15 CONTINUE

 DO 16 I=1,N

 IF(I-K) 17,16,17

 17 W=AA(I,K)

 IF(W) 18,16,18

 18 DO 19 J=1,M

 IF(J-K) 20,19,20

 20 AA(I,J)=-W\*X(J)+AA(I,J)

 19 CONTINUE

 AA(I,K)=-W\*PIVI

 16 CONTINUE

 AA(K,K)=PIVI

 EPS=DMAX1(RMAX\*1.D-33,EPS)

 2 CONTINUE

 DO 21 I=1,N

 22 K=IPERM(I)

 IF(K-I) 23,21,23

 23 IW=IPERM(K)

 IPERM(K)=IPERM(I)

 IPERM(I)=IW

 DO 24 J=1,M

 W=AA(I,J)

 AA(I,J)=AA(K,J)

 AA(K,J)=W

 24 CONTINUE

 GO TO 22

 21 CONTINUE

 11 RETURN

 80 CONTINUE

 WRITE(6,201) N,N2

 IND=4

 GO TO 11

 201 FORMAT(/'N1=',I5,' N2=',I5,' MEMORY-OVER')

 200 FORMAT(/'THE GIVEN MATRIX IS SINGULAR')

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE GAUSSZ(A,X,N0,N)

C \*\*\* GAUSS-ZAIDEL SWEEP OUT CALCULATION

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION A(N0,N0),X(N0),JUNJO(N0),SCALEF(N0),WORK(N0)

 DO 1 I=1,N

 1 JUNJO(I)=I

C

 DO 2 I=1,N

 P=DABS(A(1,1))

 DO 3 J=2,N

 3 P=DMAX1(P,DABS(A(I,J)))

 IF(P.EQ.0.D0) GO TO 9001

 DO 4 J=1,N

 4 A(I,J)=A(I,J)/P

 2 X(I)=X(I)/P

 DO 5 J=1,N

 P=DABS(A(1,J))

 DO 6 I=2,N

 6 P=DMAX1(P,DABS(A(I,J)))

 IF(P.EQ.0.D0) GO TO 9002

 DO 7 I=1,N

 7 A(I,J)=A(I,J)/P

 5 SCALEF(J)=P

C

 DO 8 K=1,N-1

C

 P=DABS(A(K,K))

 II=K

 JJ=K

 DO 9 I=K,N

 DO 10 J=K,N

 AA=DABS(A(I,J))

 IF(AA.LE.P) GO TO 10

 P=AA

 II=I

 JJ=J

 10 CONTINUE

 9 CONTINUE

 IF(P.LT.1.0D-8) GO TO 9003

 DO 11 I=1,N

 W=A(I,K)

 A(I,K)=A(I,JJ)

 11 A(I,JJ)=W

 DO 12 J=K,N

 W=A(K,J)

 A(K,J)=A(II,J)

 12 A(II,J)=W

 W=X(K)

 X(K)=X(II)

 X(II)=W

 J=JUNJO(K)

 JUNJO(K)=JUNJO(JJ)

 JUNJO(JJ)=J

C

 P=A(K,K)

 DO 13 J=K,N

 13 A(K,J)=A(K,J)/P

 X(K)=X(K)/P

 DO 14 I=K+1,N

 Q=A(I,K)

 DO 15 J=K+1,N

 15 A(I,J)=A(I,J)-Q\*A(K,J)

 14 X(I)=X(I)-Q\*X(K)

 8 CONTINUE

 X(N)=X(N)/A(N,N)

C

 DO 16 L=2,N

 K=N-L+2

 DO 16 I=1,K-1

 16 X(I)=X(I)-X(K)\*A(I,K)

C

 DO 17 I=1,N

 17 WORK(I)=X(I)

 DO 18 I=1,N

 J=JUNJO(I)

 18 X(J)=WORK(I)/SCALEF(J)

 RETURN

C

 9001 WRITE(6,200)

 200 FORMAT('I-TH ROW=0')

 GO TO 80

 9002 WRITE(6,201)

 201 FORMAT('I-TH COL=0')

 GO TO 80

 9003 WRITE(6,202)

 202 FORMAT('SMALL PIVOT')

 80 STOP

 END

C \* \* \* \* \* \* \* \* \* \*

 FUNCTION VFUNC(C)

C \*\*\* VFUNC(C)=0, WHEN C IS LESS THAN 0

 IMPLICIT REAL\*8(A-H,O-Z)

 VFUNC=0.D0

 IF(C.GT.0.D0) VFUNC=C

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE PRINCE(SX,SY,TA,S1,S3,T)

C \*\*\* CALCULATE PRINCIPAL STRESSES

 IMPLICIT REAL\*8(A-H,O-Z)

 C=.5D0\*(SX+SY)

 A1=(SY-SX)\*.5D0

 A2=A1\*A1+TA\*TA

 A=0.D0

 IF(A2.GT.0.D0) A=DSQRT(A2)

 S1=C+A

 S3=C-A

 IF(SY.EQ.S3) GO TO 1

 T1=TA/(SY-S3)

 T=DATAN(T1)

 GO TO 2

 1 T=3.141592653589793D0\*.5D0

 2 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE MULT(A,B,C,L,M,N)

C \*\*\* MULTIPLY MATRIX A \* B

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION A(L,M),B(M,N),C(L,N)

 DO 1 I=1,L

 DO 1 J=1,N

 C(I,J)=0.D0

 DO 1 K=1,M

 1 C(I,J)=C(I,J)+A(I,K)\*B(K,J)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE WULT(A,B,C,L,M,N)

C \*\*\* MULTIPLY MATRIX A(TRANSPOSE) \* B

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION A(M,L),B(M,N),C(L,N)

 DO 1 I=1,L

 DO 1 J=1,N

 C(I,J)=0.D0

 DO 1 K=1,M

 1 C(I,J)=C(I,J)+A(K,I)\*B(K,J)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE XULT(A,B,C,L,M,N)

C \*\*\* MULTIPLY MATRIX A \* B(TRANSPOSE)

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION A(L,M),B(N,M),C(L,N)

 DO 1 I=1,L

 DO 1 J=1,N

 C(I,J)=0.D0

 DO 1 K=1,M

 1 C(I,J)=C(I,J)+A(I,K)\*B(J,K)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE VULT(A,U,V,M,N)

C \*\*\* MULTIPLY MATRIX A \* VECTOR U

 IMPLICIT REAL\*8(A-H,O-Z)

 DIMENSION A(M,N),U(N),V(M)

 DO 1 I=1,M

 V(I)=0.D0

 DO 1 J=1,N

 1 V(I)=V(I)+A(I,J)\*U(J)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE OUTPUT

C \*\*\* RESULT OUTPUT

 IMPLICIT REAL\*8(A-H,O-Z)

 CHARACTER\*5 AC(1250)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB5/DBM(1250,6,8),BMX(1250,4,8),SDL(1250),CDL(1250)

 COMMON/LAB6/GKK(2600,2600),TF(2600),TU(2600),FF(2600)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LAB8/ROU(1250),CC(1250),SFI(1250),CFI(1250)

 COMMON/LAB9/NBA,LBA(1250),LOI(60),LRE(1250),LSTP(200)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB12/ST0(1250,4),STA(1250,4),STAX(1250,4),SST(1250,4)

 COMMON/LB13/STB(1250,4),STC(1250,4),EPE(1250,4),STI(1250,4)

 COMMON/LB14/ISTP,MSTP,NTRY,IDL,NDY,MDY,NDI

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 COMMON/LB21/PS1(1250),PS3(1250),QS1(1250),QS3(1250)

 COMMON/LB22/TTS(1250)

 DIMENSION UX(1300),UY(1300),UM(1300),WST(1250,7)

C

 IST=ISTP

 IOUT=LSTP(IST)

 WRITE(6,200) ISTP

 SCU=SCC

 QTU(NN)=0.D0

 DO 2 I=1,NNP

 JX=LY(3\*I-2)

 JY=LY(3\*I-1)

 JM=LY(3\*I)

 UX(I)=QTU(JX)\*SCU

 UY(I)=QTU(JY)\*SCU

 UM(I)=QTU(JM)\*SCU

 2 CONTINUE

 PRES=DELP\*FLOAT(IST)

 WRITE(8,220) PRES,UY(NDI)

C

 IF(IOUT.LE.0) GO TO 20

 CALL MAVS1

 CALL MAVS2

 WRITE(6,201) (UX(I),I=1,NNP)

 WRITE(6,213)

 WRITE(6,201) (UY(I),I=1,NNP)

 WRITE(6,202)

 DO 10 L=1,NNE

 TTS(L)=0.0

 KOL2=K2(L)

 A=1.D0

 IF(KOL2.EQ.1.OR.KOL2.EQ.3) A=PP(L)

 DO 12 I=1,4

 12 WST(L,I)=STB(L,I)\*A

 DO 14 I=5,7

 14 WST(L,I)=0.D0

 IF(KOL2.LE.3.OR.KOL2.GE.6) GO TO 10

 SX=WST(L,1)

 SY=WST(L,2)

 TA=WST(L,3)

 CALL PRINCE(SX,SY,TA,S1,S3,TH)

 WST(L,5)=S1

 WST(L,6)=S3

 WST(L,7)=TH\*180.D0/3.141592653589793D0

 IF(WST(L,6).LE.0.0) TTS(L)=2.0

 10 CONTINUE

C DO 16 I=1,7

C WRITE(6,203) (WST(L,I),L=1,NNE)

C 16 WRITE(6,213)

C WRITE(6,204) (PI2(L),L=1,NNE)

 IF(NFAT.EQ.0) GO TO 140

 WRITE(6,205) (KFA(K),K=1,NFAT)

 WRITE(6,218)

 DO 50 K=1,NFAT

 LI=KFA(K)

 50 UY(K)=PI4(LI)\*180.D0/3.141592653589793D0

 WRITE(6,203) (UY(K),K=1,NFAT)

 IF(NTS.GE.1) WRITE(6,212) (ITS(K),K=1,NTS)

 140 CONTINUE

 20 CONTINUE

 200 FORMAT(/'LOADING STEP',I5/'DISP. X, Y')

 201 FORMAT(10E11.3)

 202 FORMAT('STRESS SR,SZ,TA,ST,S1,S3,TH')

 203 FORMAT(10E10.2)

 204 FORMAT('SAFETY-FACTOR'/(10F7.3))

 205 FORMAT('YIELD-ELEMENT'/(10I5))

 206 FORMAT('YIELD-FACTOR'/(10F7.3))

 207 FORMAT('INITIAL-STRESSES')

 208 FORMAT('YIELD-STRESSES SX,SY,TA,S1,S3,TH')

 209 FORMAT('PLASTIC STRAINS %')

 210 FORMAT('FAILURE STEP'/(10I5))

 211 FORMAT('THRUST R,N,S',3F10.3)

 212 FORMAT('NO-TENSION EL.'/(10I5))

 213 FORMAT(' ')

 215 FORMAT(7E12.4)

 216 FORMAT('EQUIVALENT NODAL FORCE'/' EL NODES')

 217 FORMAT(16I4)

 218 FORMAT('ANGLE OF S1, SLIP-SUR. DISP')

 219 FORMAT('LEFT-1, RIGHT-2'/(10I5))

 220 FORMAT(2E12.3)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE MAVS1

C \*\*\* MICRO-AVS10 OUTPUT (PART 1: DIRECTION OF SHEAR BAND)

 IMPLICIT REAL\*8(A-H,O-Z)

 CHARACTER\*5 AC(900)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LB11/PI1(1250),PI2(1250),PI3(1250),PI4(1250),PI5(1250)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION SX(1250),SY(1250),XXX(1300),YYY(1300)

 DIMENSION J(1250)

C

 DO 2 L=1,NNE

 J(L)=1

 SX(L)=0.D0

 SY(L)=0.D0

 IF(JFA(L).LE.0.AND.JTS(L).LE.0) GO TO 2

 IF(JTS(L).GE.1) SI=3.14159D0\*0.5D0

 IF(JFA(L).GE.1) SI=PI4(L)

 SX(L)=DCOS(SI)

 SY(L)=DSIN(SI)

 2 CONTINUE

C

 WRITE(11,301) NNP,NNE

 DO 8 I=1,NNP

 XXX(I)=XX(I)\*100.D0

 YYY(I)=YY(I)\*100.D0

 WRITE(11,302) I,XXX(I),YYY(I),0

 8 CONTINUE

C

 DO 10 L=1,NNE

 AC(L)='quad'

 IF(IJK(L,4).EQ.0) AC(L)='tri'

 IF(IJK(L,3).EQ.0) GO TO 10

 WRITE(11,303) L,J(L),AC(L),(IJK(L,I),I=1,4)

 10 CONTINUE

 WRITE(11,304)

 WRITE(11,305)

 WRITE(11,306)

 DO 12 I=1,NNE

 12 WRITE(11,307) I,SX(I),SY(I)

C

 301 FORMAT(2I5,4X,'0',4X,'2',4X,'0')

 302 FORMAT(I5,2F12.3,F9.3)

 303 FORMAT(2I5,A8,I4,20I5)

 304 FORMAT(3X,'2',3X,'1',4X,'1')

 305 FORMAT('strX , (kN/m2)')

 306 FORMAT('strY , (kN/m2)')

 307 FORMAT(I5,3E13.5)

 RETURN

 END

C \* \* \* \* \* \* \* \* \* \*

 SUBROUTINE MAVS2

C \*\*\* MICRO-AVS10 OUTPUT (PART 2: DISPLACEMENTS & YIELD ELEMENTS)

 IMPLICIT REAL\*8(A-H,O-Z)

 CHARACTER\*5 AC(900)

 COMMON/LAB1/NNP,NNE,NFL,NSTP,NIS,NFA,NFAT,NY,NN,NVM,ITER,ICR

 COMMON/LAB2/XX(1300),YY(1300),DMX(1250,4,4),DIX(1250,4,4)

 COMMON/LAB4/K2(1250),IJK(1250,4),IX(1300),IY(1300),IQ(1300)

 COMMON/LAB7/AES(1250),EE(1250),PP(1250),HH(1250)

 COMMON/LB10/LX(6500),LY(6500),NDF(6500),LLL(1250,8)

 COMMON/LB15/QST(1250,4),PST(1250,4),QTU(2600),PTU(2600)

 COMMON/LB17/IFA(1250),JFA(1250),KFA(1250),MFA(1250),IFS(1250)

 COMMON/LB19/DWE(20),RKH,THB,GSB,SCC,ERR,DELP

 COMMON/LB20/NTS,ITS(1250),JTS(1250),LFA(1250)

 DIMENSION UX(1300),UY(1300),UM(1300),PI9(1250)

C

 QTU(NN)=0.D0

 DO 2 I=1,NNP

 JX=LY(3\*I-2)

 JY=LY(3\*I-1)

 JM=LY(3\*I)

 SCU=SCC

 UX(I)=QTU(JX)\*SCU

 UY(I)=QTU(JY)\*SCU

 2 CONTINUE

 WRITE(12,310) 1

 WRITE(12,311)

 WRITE(12,300) 1

C

 WRITE(12,301) NNP,NNE

 DO 10 I=1,NNP

 10 WRITE(12,302) I,XX(I),YY(I),0

 DO 12 L=1,NNE

 AC(L)='quad'

 IF(IJK(L,4).EQ.0) AC(L)='tri'

 IF(IJK(L,3).EQ.0) AC(L)='line'

 WRITE(12,303) L,K2(L),AC(L),(IJK(L,I),I=1,4)

 12 CONTINUE

 WRITE(12,304)

 WRITE(12,305)

 WRITE(12,306)

 WRITE(12,307)

 WRITE(12,308)

 DO 14 I=1,NNP

 14 WRITE(12,309) I,UX(I),UY(I),0

 WRITE(12,313)

 WRITE(12,314)

 DO 20 L=1,NNE

 PI9(L)=0.1D0

 IF(JTS(L).GE.1) PI9(L)=1.D0

 IF(JFA(L).GE.1) PI9(L)=2.D0

 20 CONTINUE

 DO 24 L=1,NNE

 24 WRITE(12,315) L,PI9(L)

C

 300 FORMAT('step',I1)

 301 FORMAT(2I5)

 302 FORMAT(I5,3F10.4)

 303 FORMAT(2I5,A6,20I5)

 304 FORMAT(4X,'3',4X,'1')

 305 FORMAT(4X,'3',4X,'1',4X,'1',4X,'1')

 306 FORMAT(1X,'disp\_x, m')

 307 FORMAT(1X,'disp\_y, m')

 308 FORMAT(1X,'disp\_z, m')

 309 FORMAT(I5,3E14.4)

 310 FORMAT(I5)

 311 FORMAT('data\_geom')

 313 FORMAT(4X,'1',4X,'1')

 314 FORMAT(1X,'no')

 315 FORMAT(I5,E12.3)

 RETURN

 END