

H2. FOR

PROGRAM MULLER

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浜野論文1)の特異解を求める (8, 12元)

<<951020>>

SM12I.FOR で応力変位を求める

IMPLICIT DOUBLE PRECISION (A-H, O-Z)

COMPLEX*16 RTS(1000)

CHARACTER*15 NAME

REAL*8 M, FAI, G1, G2, P01, P02, PI, PSI

LOGICAL FNREAL

WRITE(6, '(A#)') G1, G2='

READ(5, *) G1, G2

WRITE(6, '(A#)') PSI='

READ(5, *) PSI

* WRITE(6, '(A#)') ' INPUT FILE NAME ?'

* READ(5, *) NAME

* OPEN(2, STATUS='UNKNOWN', FILE=NAME)

OPEN(2, STATUS='UNKNOWN', FILE='RTSR.DAT')

OPEN(3, STATUS='UNKNOWN', FILE='RTSI.DAT')

WRITE(2, *) PSI, G1, G2

* 特異解を求めるときは不要であるが応力を求めるときは必要

IB=180

IE=360

IST=1

PI=3.14159265358979323846

P01=.3D0

P02=.3D0

DO 200 I=IB, IE, IST

FAI=FLOAT(I)

WRITE(6, *) FAI

IF(FAI.EQ.180) FAI=180.1D0

IF(FAI.EQ.360) FAI=359.9D0

SS=180.D0-0.5D0*FAI

CALL MUL(RTS, FNREAL, FAI, PSI, G1, G2, P01, P02, SS)

200 CONTINUE

CLOSE(2)

STOP

END

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SUBROUTINE MUL(RTS, FNREAL, FAI, PSI, G1, G2, P01, P02, SS)

IMPLICIT DOUBLE PRECISION (A-H, O-Z)

COMPLEX*16 RTS(1000)

COMPLEX*16 RT, H, DELFPR, FRTDEF, LAMBDA, DELF, DFPRLM, NUM,

* DEN, G, SQR, FRT, FRTPRV

REAL*8 FAI, PSI, G1, G2, EP1, EP2, EPS1, EPS2, RTSR, RTSI

LOGICAL FNREAL

MAXIT=40

EP1=1.0E-12

EP2=1.0E-12

EPS1=DMAX1(EP1, 1.E-16)

EPS2=DMAX1(EP2, 1.E-16)

KN=0

N=10

IBEG=KN+1

IEND=KN+N

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DO 100 I=IBEG, IEND
RTS(I)=(0.5D0, 0.0D0)
KOUNT=0
1 H=.01D0
RT=RTS(I)+H
ASSIGN 10 TO NN
GO TO 70
10 DELFPR=FRTDEF
RT=RTS(I)-H
ASSIGN 20 TO NN
GO TO 70
20 FRTPRV=FRTDEF
DELFPR=FRTPRV-DELFPR
RT=RTS(I)
ASSIGN 30 TO NN
GO TO 70
30 ASSIGN 80 TO NN
LAMBDA=-.5D0
40 DELF=FRTDEF-FRTPRV
DFPRLM=DELFPR*LAMBDA
NUM=-FRTDEF*(1.D0+LAMBDA)*2.D0
G=(1.D0+LAMBDA*2.D0)*DELF-LAMBDA*DFPRLM
SQR=G*G+2.D0*NUM*LAMBDA*(DELF-DFPRLM)
IF (FNREAL.AND.REAL(SQR).LT.0.D0) SQR=0.D0
SQR=CSQRT(SQR)
DEN=G+SQR
IF (REAL(G)*REAL(SQR)+AIMAG(G)*AIMAG(SQR).LT.0.D0) DEN=G-SQR
IF (CDABS(DEN).EQ.0.0D0) DEN=1.D0
LAMBDA=NUM/DEN
FRTPRV=FRTDEF
DELFPR=DELF
H=H*LAMBDA
RT=RT+H
IF (KOUNT.GT.MAXIT) GO TO 100
70 KOUNT=KOUNT+1
IF (SS.GE.PSI) THEN
CALL FD1(RT, FRT, FAI, PSI, G1, G2, P01, P02)
ELSE
CALL FD2(RT, FRT, FAI, PSI, G1, G2, P01, P02)
END IF
* WRITE(6, 1000) KOUNT, RT, FRT
* 1000 FORMAT(1H , 13, 5X, 4E15.8)
FRTDEF=FRT
IF (I.LT.2) GO TO 75
DO 71 J=2, I
DEN=RT-RTS(J-1)
IF (CDABS(DEN).LT.EPS2) GO TO 79
71 FRTDEF=FRTDEF/DEN
75 GO TO NN, (10, 20, 30, 80)
79 RTS(I)=RT+.001D0
GO TO 1
80 IF (CDABS(H).LT.EPS1*CDABS(RT)) GO TO 100
IF (DMAX1(CDABS(FRT), CDABS(FRTDEF)).LT.EPS2) GO TO 100
IF (CDABS(FRTDEF).LT.10.D0*CDABS(FRTPRV)) GO TO 40
H=0.5D0*H
LAMBDA=0.5D0*LAMBDA

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WRITE (6, 1020) H, LAMBDA
1020 FORMAT (1H , 4E15. 8)
RT=RT-H
GO TO 70
100 RTS (I)=RT
DO 101 J=IBEG, IEND
IF (REAL (RTS (J)) . GT. 0. 01D0. AND. REAL (RTS (J)) . LE. 0. 999D0. AND.
* AIMAG (RTS (J)) . GE. -0. 01D0. AND. AIMAG (RTS (J)) . LT. 0. 5D0) THEN
WRITE (6, *) '      Z'
WRITE (6, 1994) RTS (J)
RTSR=REAL (RTS (J))
RTSI=AIMAG (RTS (J))
* Stress, Displacement
WRITE (2, 1995) FAI, RTS (J)
IF (FAI. EQ. 180. 1D0) FAI=180. D0
IF (FAI. EQ. 359. 9D0) FAI=360. D0
* Particular Solution
* WRITE (2, 1995) FAI, RTSR
* IF (RTSI. GE. 0. 001D0) WRITE (3, 1995) FAI, RTSI
ENDIF
101 CONTINUE
1994 FORMAT (1H , 2E15. 8)
1995 FORMAT (1H , F8. 1, 2E15. 8)
RETURN
END

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SUBROUTINE FD1 (RAM, DET, FAI, PSI, G1, G2, P01, P02)
IMPLICIT DOUBLE PRECISION (A-H, O-Z)
COMPLEX*16 RAM, DET, RAM1, RAM2, ALF, BET, ALF2, BET2, SAL, CAL, SBT, CBT,
* SAL2, CAL2, SBT2, CBT2, R1, R2, Q1, Q2, P1, P2, A(8, 8)
REAL*8 M, FAI, PSI, FA, PS, B, G1, G2
B=CABS (RAM)
IF (B. EQ. 0. 0) RAM=(0. 001D0, 0. 0D0)
PI=3. 14159265358979323846
M=G2/G1
HEN1=3. D0-4. 0D0*P01
HEN2=3. D0-4. 0D0*P02
FA=FAI*PI/180. D0
PS=PSI*PI/180. D0
RAM1=RAM+1. 0D0
RAM2=RAM-1. 0D0
ALF=RAM1*(0. 5D0*FA-PS)
BET=RAM2*(0. 5D0*FA-PS)
ALF2=RAM1*FA
BET2=RAM2*FA
SAL=CDSIN (ALF)
CAL=CDCOS (ALF)
SBT=CDSIN (BET)
CBT=CDCOS (BET)
SAL2=CDSIN (ALF2)
CAL2=CDCOS (ALF2)
SBT2=CDSIN (BET2)
CBT2=CDCOS (BET2)
R1=(RAM+HEN1)/(RAM-HEN1)
R2=(RAM+HEN2)/(RAM-HEN2)
Q1=RAM2/(RAM-HEN1)

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Q2=RAM2/ (RAM-HEN2)
P1=RAM1/ (RAM-HEN1)
P2=RAM1/ (RAM-HEN2)
DO 30 L1=1, 8
    DO 30 L2=1, 8
        A(L1, L2)=(0. 0D0, 0. 0D0)
30 CONTINUE
A(1, 2)=1. DO
A(1, 4)=P1
A(2, 1)=1. DO
A(2, 3)=Q1
A(3, 1)=SAL
A(3, 2)=CAL
A(3, 3)=SBT
A(3, 4)=CBT
A(3, 5)=-SAL
A(3, 6)=-CAL
A(3, 7)=-SBT
A(3, 8)=-CBT
A(4, 1)=SAL
A(4, 2)=CAL
A(4, 3)=P1*SBT
A(4, 4)=P1*CBT
A(4, 5)=-M*SAL
A(4, 6)=-M*CAL
A(4, 7)=-P2*M*SBT
A(4, 8)=-P2*M*CBT
A(5, 1)=CAL
A(5, 2)=-SAL
A(5, 3)=R1*CBT
A(5, 4)=-R1*SBT
A(5, 5)=-CAL
A(5, 6)=SAL
A(5, 7)=-R2*CBT
A(5, 8)=R2*SBT
A(6, 1)=CAL
A(6, 2)=-SAL
A(6, 3)=Q1*CBT
A(6, 4)=-Q1*SBT
A(6, 5)=-M*CAL
A(6, 6)=M*SAL
A(6, 7)=-Q2*M*CBT
A(6, 8)=Q2*M*SBT
A(7, 5)=SAL2
A(7, 6)=CAL2
A(7, 7)=P2*SBT2
A(7, 8)=P2*CBT2
A(8, 5)=CAL2
A(8, 6)=-SAL2
A(8, 7)=Q2*CBT2
A(8, 8)=-Q2*SBT2
CALL CDET (A, 8, 8, DET)
RETURN
END

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SUBROUTINE FD2 (RAM, DET, FAI, PSI, G1, G2, P01, P02)

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IMPLICIT DOUBLE PRECISION (A-H, O-Z)
COMPLEX*16 RAM, DET, RAM1, RAM2, ALF, BET, ALF2, BET2, SAL, CAL, SBT, CBT,
* SAL2, CAL2, SBT2, CBT2, R1, R2, Q1, Q2, P1, P2, A(12, 12),
* GAM, GAM2, SGM, CGM, SGM2, CGM2
REAL*8 M, FAI, PSI, FA, PS, B, G1, G2
B=CABS (RAM)
IF (B.EQ. 0. 0) RAM=(0. 001D0, 0. 0D0)
PI=3. 14159265358979323846
M=G2/G1
HEN1=3. D0-4. D0*P01
HEN2=3. D0-4. D0*P02
FA=FAI*PI/180. D0
PS=PSI*PI/180. D0
RAM1=RAM+1. 0D0
RAM2=RAM-1. 0D0
ALF=RAM1*(0. 5D0*FA-PS)
BET=RAM2*(0. 5D0*FA-PS)
GAM=RAM1*FA
ALF2=RAM1*(0. 5D0*FA-PS+PI)
BET2=RAM2*(0. 5D0*FA-PS+PI)
GAM2=RAM2*FA
SAL=CDSIN (ALF)
CAL=CDCOS (ALF)
SBT=CDSIN (BET)
CBT=CDCOS (BET)
SGM=CDSIN (GAM)
CGM=CDCOS (GAM)
SAL2=CDSIN (ALF2)
CAL2=CDCOS (ALF2)
SBT2=CDSIN (BET2)
CBT2=CDCOS (BET2)
SGM2=CDSIN (GAM2)
CGM2=CDCOS (GAM2)
R1=(RAM+HEN1)/(RAM-HEN1)
R2=(RAM+HEN2)/(RAM-HEN2)
Q1=RAM2/(RAM-HEN1)
Q2=RAM2/(RAM-HEN2)
P1=RAM1/(RAM-HEN1)
P2=RAM1/(RAM-HEN2)
DO 30 L1=1, 12
    DO 40 L2=1, 12
        A(L1, L2)=(0. 0D0, 0. 0D0)
40    CONTINUE
30    CONTINUE
A(1, 2)=1. D0
A(1, 4)=P1
A(2, 1)=1. D0
A(2, 3)=Q1
A(3, 1)=SAL
A(3, 2)=CAL
A(3, 3)=SBT
A(3, 4)=CBT
A(3, 5)=-SAL
A(3, 6)=-CAL
A(3, 7)=-SBT
A(3, 8)=-CBT

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A(4, 1)=SAL
A(4, 2)=CAL
A(4, 3)=P1*SBT
A(4, 4)=P1*CBT
A(4, 5)=-M*SAL
A(4, 6)=-M*CAL
A(4, 7)=-P2*M*SBT
A(4, 8)=-P2*M*CBT
A(5, 1)=CAL
A(5, 2)=-SAL
A(5, 3)=R1*CBT
A(5, 4)=-R1*SBT
A(5, 5)=-CAL
A(5, 6)=SAL
A(5, 7)=-R2*CBT
A(5, 8)=R2*SBT
A(6, 1)=CAL
A(6, 2)=-SAL
A(6, 3)=Q1*CBT
A(6, 4)=-Q1*SBT
A(6, 5)=-M*CAL
A(6, 6)=M*SAL
A(6, 7)=-Q2*M*CBT
A(6, 8)=Q2*M*SBT
A(7, 5)=SAL2
A(7, 6)=CAL2
A(7, 7)=SBT2
A(7, 8)=CBT2
A(7, 9)=-SAL2
A(7, 10)=-CAL2
A(7, 11)=-SBT2
A(7, 12)=-CBT2
A(8, 5)=M*SAL2
A(8, 6)=M*CAL2
A(8, 7)=P2*M*SBT2
A(8, 8)=P2*M*CBT2
A(8, 9)=-SAL2
A(8, 10)=-CAL2
A(8, 11)=-P1*SBT2
A(8, 12)=-P1*CBT2
A(9, 5)=CAL2
A(9, 6)=-SAL2
A(9, 7)=R2*CBT2
A(9, 8)=-R2*SBT2
A(9, 9)=-CAL2
A(9, 10)=SAL2
A(9, 11)=-R1*CBT2
A(9, 12)=R1*SBT2
A(10, 5)=M*CAL2
A(10, 6)=-M*SAL2
A(10, 7)=Q2*M*CBT2
A(10, 8)=-Q2*M*SBT2
A(10, 9)=-CAL2
A(10, 10)=SAL2
A(10, 11)=-Q1*CBT2
A(10, 12)=Q1*SBT2

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A(11, 9)=SGM
A(11, 10)=CGM
A(11, 11)=P1*SGM2
A(11, 12)=P1*CGM2
A(12, 9)=CGM
A(12, 10)=-SGM
A(12, 11)=Q1*CGM2
A(12, 12)=-Q1*SGM2
CALL CDET(A, 12, 12, DET)
RETURN
END

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SUBROUTINE CDET(A, N, ID, DET)
IMPLICIT DOUBLE PRECISION(A-H, O-Z)
COMPLEX*16 A(ID, ID), DET, W2, PIV2
DET=(1.0D0, 0.0D0)
DO 100 K=1, N
  PIV=0.0D0
  IPIVR=0
  DO 110 I=K, N
    W=CABS(A(I, K))
    IF(PIV.GE.W) GO TO 110
    PIV=W
    IPIVR=I
110  CONTINUE
  PIV2=A(IPIVR, K)
  IF(IPIVR.EQ.K) GO TO 130
  DO 120 J=1, N
    W2=A(IPIVR, J)
    A(IPIVR, J)=A(K, J)
120  A(K, J)=W2
  DET=-DET
130  DET=DET*PIV2
  IF(CABS(DET).GE.1.0D0) DET=DET/1.0D0
  DO 140 J=1, N
140  A(K, J)=A(K, J)/PIV2
  DO 150 I=K, N
    IF(I.EQ.K) GO TO 150
    W2=A(I, K)
    A(I, K)=(0.0D60, 0.0D60)
    L=K+1
    DO 160 J=L, N
160  A(I, J)=A(I, J)-A(K, J)*W2
150  CONTINUE
100 CONTINUE
RETURN
END

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