

C234567

```
DIMENSION A(20,20),B(20,20),C(20,20),D(20),E(20,20),F(50,50)
DIMENSION G(20),H(20,20),P(20,20),AA(20,20),AB(20,20),AC(20,20)
DIMENSION AD(50,50),AE(50,50),AF(50,50),AG(50,50),V(50,50)
DIMENSION T(50,50),R(50,50)
```

C

C PEMBERITAHUAN PENGGUNAAN METODE BEDA TENGAH

C

```
WRITE(*,'(24(/))')
WRITE(*,*)'*****'
WRITE(*,*)' ANDA SEDANG MENGGUNAKAN METODA BEDA TENGAH *'
WRITE(*,*)' IKUTI ATURAN MAINNYA, OKE !! *'
WRITE(*,*)'*****'
```

C

C Menanyakan derajat kebebasan persamaan, sebut dengan N

C

```
WRITE(*,'(4(/))')
WRITE(*,'(1X,A)')'BERAPA DERAJAT KEBEBASAN ANDA INGINKAN ?'
READ(*,'(BN,I2)')N
```

C

C Memasukan data matrik massa A(I,J)

C

```
WRITE(*,'(2(/))')
WRITE(*,'(1X,A)')'MASUKKAN DATA Matrik MASSA'
WRITE(*,*)
DO 10 I=1,N
  DO 20 J=1,N
    WRITE(*,'(1X,'A(',I2,',',',I2,',')?',',',I,J)')
    READ(*,*)A(I,J)
  20 CONTINUE
10 CONTINUE
```

C

C Memasukan data matrik redaman B(I,J)

C

```
WRITE(*,'(2(/))')
WRITE(*,'(1X,A)')'MASUKKAN DATA Matrik REDAMAN'
WRITE(*,*)
DO 30 I=1,N
  DO 40 J=1,N
    WRITE(*,'(1X,'B(',I2,',',',I2,',')?',',',I,J)')
    READ(*,*)B(I,J)
  40 CONTINUE
30 CONTINUE
```

C

C Memasukan data matrik kekakuan C(I,J)

C

```
WRITE(*,'(2(/))')
WRITE(*,'(1X,A)')'MASUKKAN DATA Matrik KEKAKUAN'
WRITE(*,*)
DO 50 I=1,N
  DO 60 J=1,N
    WRITE(*,'(1X,'C(',I2,',',',I2,',')?',',',I,J)')
    READ(*,*)C(I,J)
  60 CONTINUE
50 CONTINUE
```

C

```

C Memasukan data-data gaya luar D(I,J)
C
WRITE(*, '(2(/))')
WRITE (*, '(1X,A)') 'MASUKKAN DATA GAYA-GAYA LUAR'
WRITE(*,*)
DO 70 I=1,N
WRITE (*, '(1X,"D(",I2,"")?',"') I
READ (*,*)D(I)
70 CONTINUE
C
C Masukan data perpindahan awal pada saat t = 0 AE(I,1)
C
WRITE(*, '(2(/))')
WRITE (*, '(1X,A)') 'MASUKKAN DATA PERPINDAHAN AWAL'
WRITE(*,*)
DO 80 I=1,N
WRITE (*, '(1X,"AE(",I2,"",I2,"")?',"') I,1
READ (*,*)AE(I,1)
80 CONTINUE
C
C Masukan data kecepatan awal V(I,1)
C
WRITE(*, '(2(/))')
WRITE (*, '(1X,A)') 'MASUKKAN DATA KECEPATAN AWAL'
WRITE(*,*)
DO 110 I=1,N
WRITE (*, '(1X,"V(",I2,"",I2,"")?',"') I,1
READ (*,*)V(I,1)
110 CONTINUE
C
C Mencari gaya kekakuan awal R(I,1)
C
DO 120 I=1,N
R(I,1)=0.
DO 130 J=1,N
R(I,1)=R(I,1)+C(I,J)*AE(J,1)
130 CONTINUE
120 CONTINUE
C
C Mencari gaya redaman awal T(I,1)
C
DO 140 I=1,N
T(I,1)=0
DO 150 J=1,N
T(I,1)=T(I,1)+B(I,J)*V(J,1)
150 CONTINUE
140 CONTINUE
C
C Jumlahkan gaya -gaya redaman luar dan kekakuan D(I,1)
C
DO 160 I=1,N
D(I)=D(I)+R(I,1)+T(I,1)
160 CONTINUE
C
C Mencari invers matrik massa E(I,J)
C

```

```

DO 170 I = 1,N
    DO 180 J = 1,N
        E(I,J)=A(I,J)
180     CONTINUE
170     CONTINUE
    DO 190 I = 1,N
        HH = E(I,I)
        E(I,I)=1.
    DO 200 J = 1,N
        E(I,J) = (E(I,J))/HH
200     CONTINUE
    DO 210 K=1,N
        IF (K.EQ.I) GOTO 210
        GG = E(K,I)
        E(K,I)=0.
        DO 220 J = 1,N
            E(K,J)=E(K,J) - GG*E(I,J)
220     CONTINUE
210     CONTINUE
190     CONTINUE
C
C Menghitung kecepatan awal F(I,J)
C
    DO 230 I=1,N
        F(I,1)=0
    DO 240 K=1,N
        F(I,1)=F(I,1)+E(I,K)*D(K)
240     CONTINUE
230     CONTINUE
C
C Menghitung konstanta massa dan pertambahan efektif
C
    WRITE(*,*)
    WRITE(*,*)'.....INGAT BAGAIMANA FORMAT TAMPILANNYA DAHULU'
    WRITE(*,*)'.....SETELAH ITU JAWABLAH KALIMAT BERIKUT !!!'
    WRITE(*,*)'(/,1X,A,')'BERAPA PERTAMBAHAN WAKTU SETIAP TAHAP ?'
    READ(*,*)DT
    DO=1/(DT**2)
    D1=1/(2*DT)
    D2=2*DO
    D3=1/D2
C
C Menghitung perpindahan pada saat (-delta T ) G(I)
C
    DO 250 I=1,N
        G(I)=AE(I,1)-(DT*V(I,1))+(D3*F(I,1))
250     CONTINUE
C
C Membentuk matrik massa efektif H(I,J)
C
    DO 260 I=1,N
        DO 270 J=1,N
            H(I,J)=(DO*A(I,J))+(D1*B(I,J))
270     CONTINUE
260     CONTINUE
C

```

C Mencari invers matrik massa efektif P(I,J)

C

```
      DO 280 I = 1,N
        DO 290 J = 1,N
          P(I,J)=H(I,J)
290     CONTINUE
280     CONTINUE
      DO 300 I = 1,N
        Q = P(I,I)
        P(I,I)=1.
        DO 310 J = 1,N
          P(I,J) = (P(I,J))/Q
310     CONTINUE
      DO 320 K=1,N
        IF (K.EQ.I) GOTO 320
        S = P(K,I)
        P(K,I)=0.
        DO 330 J = 1,N
          P(K,J)=P(K,J) - S*P(I,J)
330     CONTINUE
320     CONTINUE
300     CONTINUE
```

C

C Menghitung matrik konstan sebagai tetapan dalam menghitung

C matrik beban efektif AA(I,J) dan AB(I,J)

C

```
      WRITE(*,*)
      DO 340 I=1,N
        DO 350 J=1,N
          AA(I,J)=C(I,J)-DZ*A(I,J)
350     CONTINUE
340     CONTINUE
      DO 360 I=1,N
        DO 370 J=1,N
          AB(I,J)=(DC*A(I,J))-(D1*B(I,J))
370     CONTINUE
360     CONTINUE
```

C

C Mencari matrik beban efektif pada saat t=0, AD(I,1)

C

```
      DO 380 I=1,N
        AC(I,1)=0.
        DO 390 J=1,N
          AC(I,1)=AC(I,1)+AB(I,J)*G(J)
390     CONTINUE
        AD(I,1)=D(I)-AC(I,1)
380     CONTINUE
```

C

C Menanyakan tahapan yang diinginkan,M

C

```
      WRITE(*, '(1X,A, /BERAPA TAHAPAN YANG ANDA INGINKAN ?')
      READ(*, '(I2)')M
      L=M+1
```

C

C Menghitung perpindahan untuk setiap tahapan

C

```

WRITE(*,*)
DO 400 K=2,L
  DO 410 I=1,N
    AE(I,K)=0.
    DO 420 J=1,N
      AE(I,K)=AE(I,K)+P(I,J)*AD(J,I)
420    CONTINUE
410  CONTINUE
    DO 430 I=1,N
      AF(I,K)=0.
      AG(I,K)=0.
      DO 440 J=1,N
        AF(I,K)=AF(I,K)+AA(I,J)*AE(J,K)
        AG(I,K)=AG(I,K)+AB(I,J)*AE(J,K-1)
440    CONTINUE
      AD(I,K)=D(I)-AF(I,K)-AG(I,K)
      AD(I,1)=AD(I,K)
430  CONTINUE
400  CONTINUE

```

C  
C Mencetak hasil perpindahan untuk setiap tahapan AE(I,J)  
C

```

WRITE(*, '(2(/))')
DO 450 I=1,N
WRITE(*, '(1X,A)') 'PERPINDAHAN UNTUK TIAP TAHAPAN'
WRITE(*,*)'-----'

```

```

DO 460 K=2,L
  WRITE(*,*)AE(I,K)
460  CONTINUE
  PAUSE ' ENTER YAH ! '
450  CONTINUE

```

C  
C Mencari kecepatan dan percepatan V(I,J) dan F(I,J)  
C

```

DO 470 K=2,M
  DO 480 I=1,N
    V(I,K)=D1*(AE(I,K+1)-AE(I,K-1))
    F(I,K)=D0*(AE(I,K-1)-AE(I,K)+AE(I,K+1))
480  CONTINUE
470  CONTINUE

```

C  
C Mencetak hasil kecepatan setiap titik  
C

```

WRITE(*, '(2(/))')
DO 490 I=1,N
WRITE(*, '(1X,A)') 'KECEPATAN GERAK SETIAP TAHAPAN'
WRITE(*,*)'-----'

```

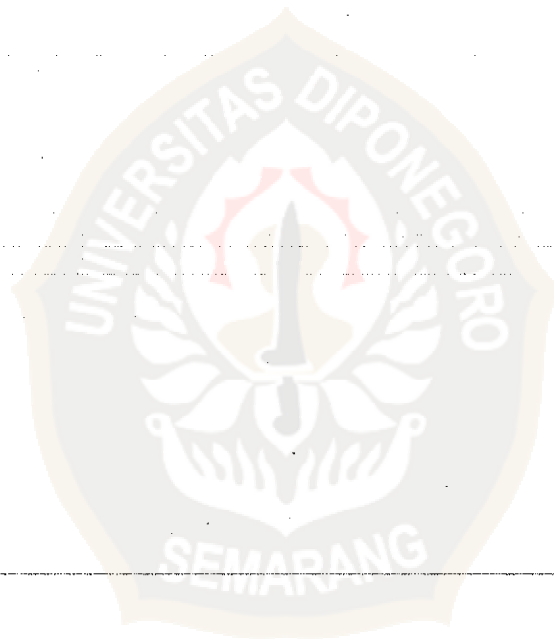
```

DO 500 K=1,M
  WRITE(*,*)V(I,K)
500  CONTINUE
  PAUSE ' ENTER LAGII !! '
490  CONTINUE

```

C  
C Mencetak percepatan untuk setiap titik  
C

```
WRITE(*, '(2()')
DO 510 I=1,N
WRITE(*, '(1X,A)') 'PERCEPATAN GERAK SETIAP TAHAPAN'
WRITE(*, *) '-----'
    DO 520 K=1,M
        WRITE(*,*)F(I,K)
520    CONTINUE
    PAUSE '    ENTER JUGA'
510    CONTINUE
END
```



C234567

DIMENSION A(20,20),B(20,20),C(20,20),D(20,1),E(20,20),F(20,20)

DIMENSION P(20,20),Q(20,20),R(20,1),S(20,1),U(50,50),BE(20,20)

DIMENSION V(50,50),W(50,50)

C

C Pemberitahuan metoda yang sedang digunakan

C

WRITE(\*,'(24(/))')

WRITE(\*,\*)'\*\*\*\*\*'

WRITE(\*,\*)'ANDA SEDANG MENYELESAIKAN PERSAMAAN KESETIMBANGAN\*'

WRITE(\*,\*)' PADA ANALISIS DINAMIK MENGGUNAKAN \*'

WRITE(\*,\*)' MENGGUNAKAN METODE HOUBOLT \*'

WRITE(\*,\*)'\*\*\*\*\*'

C

C Memasukan jumlah derajat kebebasan

C

WRITE(\*,'(2(/))')

WRITE(\*,'(1X,A,)'BERAPA DERAJAT KEBEBASAN ANDA INGINKAN ?')

READ(\*,'(BN,I2)')N

C

C Memasukan data matrik massa A(I,J)

C

WRITE(\*,'(2(/))')

WRITE(\*,'(1X,A)')'MASUKKAN DATA MATRIK MASSA'

WRITE(\*,\*)

DO 20 I=1,N

DO 10 J=1,N

WRITE(\*,'(1X, 'A('I2, ', ', 'I2, ') ? ', 'I,J

READ(\*,\*)A(I,J)

10 CONTINUE

20 CONTINUE

C

C Memasukan data matrik redaman B(I,J)

C

WRITE(\*,'(2(/))')

WRITE(\*,'(1X,A)')'MASUKKAN DATA MATRIK REDAMAN'

WRITE(\*,\*)

```

DO 40 I=1,N
  DO 30 J=1,N
    WRITE(*, '(1X, "B(", I2, ", ", I2, ")?")', I, J)
    READ(*, *)B(I, J)

```

```
30 CONTINUE
```

```
40 CONTINUE
```

C

C Memasukan data matrik kekakuan C(I,J)

C

```
WRITE(*, '(2( / ))')
```

```
WRITE(*, '(1X, A)') 'MASUKAN DATA MatriK KEKAKUAN'
```

```
WRITE(*, *)
```

```
DO 60 I=1,N
```

```
  DO 50 J=1,N
```

```
    WRITE(*, '(1X, "C(", I2, ", ", I2, ")?")', I, J)
```

```
    READ(*, *)C(I, J)
```

```
50 CONTINUE
```

```
60 CONTINUE
```

C

C Memasukan data - data gaya luar

C

```
WRITE(*, '(2( / ))')
```

```
WRITE(*, '(1X, A)') 'MASUKAN DATA GAYA-GAYA LUAR'
```

```
WRITE(*, *)
```

```
DO 70 I=1,N
```

```
  WRITE(*, '(1X, "D(", I2, ")?")', I)
```

```
  READ(*, *)D(I, 1)
```

```
70 CONTINUE
```

C

C Memasukan pertambahan integrasi

C

```
WRITE(*, '(2( / ))')
```

```
WRITE(*, '(1X, A, "BERAPA BESAR TAHAPAN INTEGRASI ?")')
```

```
READ(*, *)DT
```

C

C Menghitung nilai nilai konstanta integrasi

C



A0 = 2/(DT\*\*2)

A1 = 11/(6\*DT)

A2 = 5/(DT\*\*2)

A3 = 3/DT

A4 = -4/(DT\*\*2)

A5 = -3/(2\*DT)

A6 = 1/(DT\*\*2)

A7 = 1/(3\*DT)

C

C Membentuk matrik kekakuan efektif E(I,J)

C

DO 90 I=1,N

DO 80 J=1,N

E(I,J)=C(I,J)+A0\*A(I,J)+A1\*B(I,J)

80 CONTINUE

90 CONTINUE

C

C Mencari invers matrik E(I,J) sebut F(I,J)

C

DO 110 I=1,N

DO 100 J=1,N

F(I,J)=E(I,J)

100 CONTINUE

110 CONTINUE

DO 150 I=1,N

G=F(I,I)

F(I,I)=1.0

DO 120 J=1,N

F(I,J)=F(I,J)/G

120 CONTINUE

DO 140 K=1,N

IF(K.EQ.I) GOTO 140

H=F(K,I)

F(K,I)=0.

DO 130 J=1,N

F(K,J)=F(K,J)-H\*F(I,J)

130 CONTINUE

140 CONTINUE

150 CONTINUE

C

C Menanyakan tahapan integrasi yang diinginkan (M)

C

WRITE(\*, '(1X,A,)' BERAPA TAHAP YANG DIINGINKAN ?

READ(\*, '(BN, I2)')M

L=M+1

C

C Memasukan nilai nilai syarat awal U(0),U(1) dan U(2)

C

WRITE(\*, '(2(/))')

WRITE(\*, '(1X,A,)' MASUKAN NILAI SYARAT AWAL U(0),U(1) DAN U(2)

WRITE(\*,\*)

DO 170 J=1,3

DO 160 I=1,N

WRITE(\*, '(1X, 'U(', I2, ', ', I2, ') : ', I, J

READ(\*,\*)U(I,J)

160 CONTINUE

170 CONTINUE

C

C Mencari perpindahan untuk setiap tahap

C

DO 250 K=3,L

DO 190 I=1,N

P(I,1)=A2\*U(I,K)+A4\*U(I,K-1)+A6\*U(I,K-2)

Q(I,1)=A3\*U(I,K)+A5\*U(I,K-1)+A7\*U(I,K-2)

190 CONTINUE

DO 210 I=1,N

R(I,1)=0.

S(I,1)=0.

DO 200 J=1,N

R(I,1)=R(I,1)+A(I,J)\*P(J,1)

S(I,1)=S(I,1)+B(I,J)\*Q(J,1)

200 CONTINUE

210 CONTINUE

DO 220 I=1,N

```

        BE(I,1)=D(I,1)+R(I,1)+S(I,1)
220    CONTINUE
        DO 240 I=1,N
            U(I,K+1)=0.
            DO 290 J=1,N
                U(I,K+1)=U(I,K+1)+F(I,J)*BE(J,1)
230    CONTINUE
240    CONTINUE
250    CONTINUE
C
C Mencari nilai percepatan dan kecepatan V(I,K) dan W(I,K)
C
        DO 255 K = 3,M
            DO 256 I = 1,N
                V(I,K+1)=A0*U(I,K+1)-A2*U(I,K)-A4*U(I,K-1)-A6*U(I,K-2)
                W(I,K+1)=A1*U(I,K+1)-A3*U(I,K)-A5*U(I,K-1)-A7*U(I,K-2)
256    CONTINUE
255    CONTINUE
C
C Mencetak hasil perpindahan
C
        WRITE(*,'(2(/))')
        DO 258 I=1,N
            WRITE(*,'(1X,A)')'Perpindahan titik untuk setiap tahapan'
            WRITE(*,*)'-----'
                DO 260 K=2,L
                    WRITE(*,*)U(I,K)
260    CONTINUE
            PAUSE' TEKAN ENTER YA !!'
258    CONTINUE
C
C Mencetak hasil kecepatan
C
        WRITE(*,'(2(/))')
        DO 268 I=1,N
            WRITE(*,'(1X,A)')'Kecepatan gerak setiap titik/tahapan'
            WRITE(*,*)'-----'

```

```
DO 270 K=4,L
```

```
WRITE(*,*)V(I,K)
```

```
270 CONTINUE
```

```
PAUSE TEKAN ENTER YA !!
```

```
268 CONTINUE
```

```
C
```

```
C Mencetak hasil percepatan
```

```
C
```

```
WRITE(*, '(2(//))')
```

```
DO 278 I=1,N
```

```
WRITE(*, '(1X,A)') 'Percepatan gerak setiap titik/tahapan'
```

```
WRITE(*,*) '-----'
```

```
DO 280 K=4,L
```

```
WRITE(*,*)W(I,K)
```

```
280 CONTINUE
```

```
PAUSE TEKAN ENTER YA !!
```

```
278 CONTINUE
```

```
END
```

