LAMPIRAN 1. PENYELESAIAN PERSAMAAN PLANETRAY LAGRANGE DENGAN BAHASA KOMPUTER FORTRAN.

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C23456789
C*************************************************************************
C*************************************************************************
C*****  PENYELESAIAN PERSAMAAN DIFFERENSIAL PLANETARY LAGRANGE      *****
C***** DENGAN STUDI KASUS PENGARUH GAYA GRAVITASI BULAN TERHADAP    *****
C*****            PARAMETER-PARAMETER ORBIT SATELIT                *****
C*****       DENGAN METODE RUNGE   KUTTA ORDE KEEMPAT              *****
C*****                   NAMA : PURWANTO                           *****
C*****                   NIM  : J 101 980048                       *****
C*************************************************************************
C*************************************************************************
C
      PROGRAM PURWNTO
      IMPLICIT REAL(A-D,F-G,K-N,P-S,W-Z)
      IMPLICIT INTEGER (H,U)
      DIMENSION F(6),KA(4),KE(4),KQ(4)
      INTEGER T,NO,UT,UTG,PILIH
      REAL EB,EB,ATB,H
      CHARACTER*30 INFILE,OTFILE
C
      WRITE(*,'(A,\)')' NAMA FILE INPUT : '
      READ(*,'(A)')INFILE
      WRITE(*,'(A,\)')' NAMA FILE OUTPUT : '
      READ(*,'(A)')OTFILE
      WRITE(*,'(A,\)')' DATA MANA YANG DISIMPAN '
      WRITE(*,*)
      WRITE(*,'(A,\)')' 1 = NO,A,EB,L '
      WRITE(*,*)
      WRITE(*,'(A,\)')' 2 = NO,Q,WQ,O '
      WRITE(*,*)
      WRITE(*,'(A,\)')' PILIH = '
      READ(*,*)PILIH
C
      OPEN(1,FILE=INFILE)
      OPEN(2,FILE=OTFILE)
C
C*****    DEFINISI DARI INPUT *******
C
C    AB = SETENGAH SUMBU PANJANG ORBIT PENGGANGGU (BULAN)
C    LB = INKLINASI ORBIT PENGGANGGU (BULAN)
C    EB = EKSENTRISITAS ORBIT PENGGANGGU (BULAN)
C    ANOL = HARGA AWAL SUMBU PANJANG ORBIT SATELIT
C    ENOL = HARGA AWAL EKSENTRISITAS ORBIT SATELIT
C    LNOL = HARGA AWAL INKLINASI ORBIT SATELIT
C    QNOL = HARGA AWAL ASENSIOREKTA OF ASCENDING NODE ORBIT SATELIT
C    WQNOL = HARGA AWAL ARGUMENT OF PERIGEE ORBIT SATELIT
C    ONOL = HARGA AWAL MEAN LONGITUDE AT THE EPOCH ORBIT SATELIT
C    ME = MASSA BUMI
C    MM = MASSA PENGGANGGU (BULAN)
C    PI = 3.141592653589793
C    K  = FAKTOR PENGALI HARGA AWAL EKSENTRISITAS ANOMALY ( 0<K<1 )
C    G  = KONSTANTA GRAVITASI
C    H = SELANG WAKTU PERHITUNGAN PADA METODE RUNGE KUTTA
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C    HYMAX = WAKTU MAXIMUM TAHUN PERHITUNGAN
C
      READ(1,*)AB,LB,EB
C      WRITE(2,*)'AB=  ',AB
C      WRITE(2,*)'LB=  ',LB
C      WRITE(2,*)'EB=  ',EB
      READ(1,*)ANOL,ENOL,LNOL,QNOL,WQNOL,CNOL
C      WRITE(2,*)'ANOL=    ',ANOL
C      WRITE(2,*)'ENOL=    ',ENOL
C      WRITE(2,*)'LNOL=    ',LNOL
C      WRITE(2,*)'QNOL=    ',QNOL
C      WRITE(2,*)'WQNOL=    ',WQNOL
C      WRITE(2,*)'CNOL=   ',CNOL
      READ(1,*)ME,MM
C      WRITE(2,*)'ME=   ',ME
C      WRITE(2,*)'MM=   ',MM
      READ(1,*)PI,K,G
C      WRITE(2,*)'PI=   ',PI
C      WRITE(2,*)'K=   ',K
C      WRITE(2,*)'G=   ',G
      READ(1,*)H,HYMAX
C      WRITE(2,*)'H=   ',H
C      WRITE(2,*)'HYMAX=   ',HYMAX
C
C******   INISIALISASI   *****
C
      A=ANOL
      ES=ENOL
      L=LNOL
      Q=QNOL
      B=(WQNOL + QNOL)
      C=CNOL
C
C***** MERUBAH SUDUT DALAM DERAJAT KE RADIAN   *****
C
      LB=LB*(PI/180.)
C      WRITE(2,*)'LB=  ',LB
      L=L*(PI/180.)
C      WRITE(2,*)'L=  ',L
      Q=Q*(PI/180.)
C      WRITE(2,*)'Q=  ',Q
      B=B*(PI/180.)
C      WRITE(2,*)'B=  ',B
C
C*** MENGHITUNG HARGA MIU ***
C
      MIU=G*ME
C      WRITE(2,*) 'MIU=   ',MIU
C
      WRITE(*,100)
      IF (PILIH.EQ.1) THEN
         WRITE(2,102)
      ELSEIF (PILIH.EQ.2) THEN
         WRITE(2,103)
      ENDIF
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C
C***** PERHITUNGAN DALAM TAHUN *****
C
      NO=0
      DO 10 HY=1957,HYMAX
      Y=HY
C
C*** PERHITUNGAN DALAM BULAN ***
C
      DO 20 HM= 1,12
      IF ( HM.EQ.1) THEN
         HRMAX=31
      ELSEIF (HM.EQ.2) THEN
         HRMAX=28
      ELSEIF (HM.EQ.3) THEN
         HRMAX=31
      ELSEIF (HM.EQ.4) THEN
         HRMAX=30
      ELSEIF (HM.EQ.5) THEN
         HRMAX=31
      ELSEIF (HM.EQ.6) THEN
         HRMAX=30
      ELSEIF (HM.EQ.7) THEN
         HRMAX=31
      ELSEIF (HM.EQ.8) THEN
         HRMAX=31
      ELSEIF (HM.EQ.9) THEN
         HRMAX=30
      ELSEIF (HM.EQ.10) THEN
         HRMAX=31
      ELSEIF (HM.EQ.11) THEN
         HRMAX=30
      ELSEIF (HM.EQ.12) THEN
         HRMAX=31
      ENDIF
C
      M = HM
      IF (M.LE.2.) THEN
         Y=Y-1
         M=M+12
      EC=E*COS(EA)
      ML=MA-INT(MA/(2*PI))*(2*PI)
      SIGMA=SIN(ML*(PI/180.))
      K=SIGN(K;SIGMA)
      FPK=1.0-EC
      FPP=LE
      ELSEIF(M.GT.2) THEN
         Y=Y
         M=M
      ENDIF
C
C*** PERHITUNGAN DALAM HARI ***
C
      DO 31 HR=1,HRMAX,5
      D = HR
```

```
C
C*** PERHITUNGAN DALAM JAM ***
C
      DO 40 HI=0,86400,3600
        T= HI
        UT = INT(HI/3600) + 17
        IF (UT.LT.24) THEN
           UTG = UT
        ELSEIF(UT.GE.24) THEN
           UTG = UT-24
        ENDIF
        OB=270.434164+(481267.883142*ATB)-(0.001133*AT*ATB)
        MAB=296.104608+(477198.849108*ATB)+(0.009192*ATB*ATB)
        QB=259.183275-(1934.142008*ATB)+(0.002078*ATB*ATB)
        BD= INT(Y/400)-INT(Y/100)
        YD=INT(365.25*Y)+INT(30.6001*(M+1))+BD+1720996.5+D+(UTG/24)
        ATB=(YD-2415020.0)/36525
C       WRITE(2,*)'BD=  ',BD,'YD=  ',YD,'ATB=  ',ATB
C
C *** MENHNNGHITUING ELEMEN ORBIT BULAN***
C
        OB=270.434164+(481267.883142*ATB)-(0.001133*AT*ATB)
        MAB=296.104608+(477198.849108*ATB)+(0.009192*ATB*ATB)
        QB=259.183275-(1934.142008*ATB)+(0.002078*ATB*ATB)
C       WRITE(2,*)'OB=  ',OB,'MAB=  ',MAB,'QB=  ',QB
C
C*** MENGHITUNG EA BULAN *****
C
        CALL MNEWTON(EB,MAB,K,PI,EAB)
C       WRITE (2,*)'EAB=    ',EAB
C
C****MENGHITUNG ARGUMENT OF PERIGEE BULAN ***
C
        WB=OB-MAB
C       WRITE(2,*)'WB=   ',WB
C
C*** MENGHITUNG TRUE ANOMALY BULAN ******
C
        FB=ATAN((((1-EB**2)**(.5))*SIN(EAB))/(COS(EAB)-EB))
C       WRITE(2,*)'FB=  ',FB
C
C*** MENGHITUNG JARI-JARI BULAN ****
C
        RB=AB*(1-B*COS(EB))
C       WRITE(2,*)'RB=  ',RB
C
C*** MENGHITUNG KOORDINAT BULAN (PENGGANGGU) ***
C
        XB=RB*(COS(QB)*COS(WB-QB+FB)-SIN(QB)*SIN(WB-QB+FB)*COS(LB))
        YB=RB*(SIN(QB)*COS(WB-QB+FB)+COS(QB)*SIN(WB-QB+FB)*COS(LB))
        ZB=RB*SIN(WB-QB+FB)*SIN(LB)
C       WRITE(2,*)'XB=  ',XB,'YB=  ',YB,'ZB=   ',ZB
C
C*** MENGHITUNG KECEPATAN SUDUT (HA) SATELIT ***
C
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      NA=(MIU/(A**3))**(.5)
      L=L*(PI/180.)
      Q=Q*(PI/180.)
      B=B*PI/180.)
C      WRITE(2,*)'T=    ',T,'NA=  ',NA
C
C*** MENGHITUNG MEAN ANOMALI (MA) ORBIT SATELIT ***
C
      MAS=NA*T
C      WRITE(2,*)'MAS=   ',MAS
C
C*** MEMANGGIL ECENTRICITY ANOMALY(EA) ORBIT SATELIT ***
C
      CALL MNEWTON(ES,MAS,K,PI,EAS)
C      WRITE(2,*)'EAS=    ',EAS
C
C*** MENGHITUNG TRUE ANOMALY (FA) ORBIT SATELIT ***
C
      FA=ATAN(((((1-ES**2)**(.5))*SIN(EAS))/(COS(EAS)-ES))
C      WRITE(2,*)'FA=  ',FA
C
C*** MENGHITUNG JARI-JARI (R) ORBIT SATELIT ***
C
      R=A*(1-ES*COS(EAS))
C      WRITE(2,*)'R=  ',R
C
C*** MENGHITUNG COSINUS ARAH COSINUS ARAH SATELIT ***
C
      LS=COS(Q)*COS(B-Q+FA) SIN(Q)*SIN(B-Q+FA)*COS(L)
      MS=SIN(Q)*COS(B-Q+FA)+COS(Q)*SIN(B-Q+FA)*COS(L)
      NS=SIN(B-Q+FA)*SIN(L)
      LT=-COS(Q)*SIN(B-Q+FA)-SIN(Q)*COS(B-Q+FA)*COS(L)
      MT=-SIN(Q)*SIN(B-Q+FA)+COS(Q)*COS(B-Q+FA)*COS(L)
      NT=COS(B-Q+FA)*SIN(L)
      LW=SIN(Q)*SIN(L)
      MW=-COS(Q)*SIN(L)
      NW=COS(L)
C      WRITE(2,*)'LS=   ',LS,'MS=    ',MS,'NS=  ',NS
C      WRITE(2,*)'LT=  ',LT,'MT=  ',MT,'NT=   ',NT
C      WRITE(2,*)'LW=  ',LW,'MW=  ',MW,'NW=  ',NW
C
C*** MENGHITUNG KOORDINAT SATELIT ***
C
      X=R*LS
      Y=R*MS
      Z=R*NS
C      WRITE(2,*)'X=  ',X,'Y=  ',Y,'Z=     ',Z
C
C*** MENGHITUNG TURUNAN FUNGSI GANGGUAN ***
C*** DELTA = JARAK SATELIT DAN BULAN ***
C
      DELTA=((X-XB)**2+(Y-YB)**2+(Z-ZB)**2)**(.5)
      X=-G*MM*((X-XB)/(DELTA**3)+XB/(RB**3))
      Y=-G*MM*((Y-YB)/(DELTA**3)+YB/(RB**3))
      Z=-G*MM*((Z-ZB)/(DELTA**3)+ZB/(RB**3))
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C      WRITE(2,*)'DELTA=     ',DELTA
C      WRITE(2,*)'X=   ',X,'Y=   ',Y,'Z=    ',Z
C
C*** MENGHITUNG KOMPONEN-KOMPONEN RADIAL(S),TRANSVERSAL(ST)***
C***  DAN TEGAK LURUS(W) PADA BIDANG ORBIT SATELIT ***
C
       S=LS*RX+MS*RY+NS*RZ
       ST=LT*RX+MT*RY+NT*RZ
       W=LW*RX+MW*RY+NW*RZ
C      WRITE(2,*)'S=   ',S,'ST=     ',ST,'W=     ',W
C
C*** RUMUS UMUM METODE RUNGE-KUTTA ORDE KE EMPAT ***
C*** DENGAN PERSAMAAN DIFFERENSIAL ORDE SATU ***
C     DY/DX= F(X,Y)
C     Y(X0)= Y0
C     MAKA:
C          Y(T+1)= YT +(H/6)*(K1 + 2*K2 + 2*K3 + K4 )
C     DIMANA:
C           K1 = F(X,Y)
C           K2 = F(X + (1/2)*H , Y + (1/2)*H* K1 )
C           K3 = F(X + (1/2)*H , Y + (1/2)*H* K2 )
C           K4 = F(X + H ,   Y + H* K3 )
C     DENGAN:
C           H = SELANG WAKTU
C           T = SAAT WAKTU T
C
C*** MENGHITUNG SUMBU PANJANG A(T) ORBIT SATELIT ***
C
       F(1)=((2*(A**(1.5)))/((MIU*(1-ES**2))**(.5)))*(S*ES*SIN(FA)+
     +      (A*(1-ES**2)+ST)/R)
       KA(1)= F(1)
       KA(2)=((2*((A+(.5)*H*F(1))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*F(1))*(1-ES**2)+ST)/R)
       KA(3)=((2*((A+(.5)*H*KA(2))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*KA(2))*(1-ES**2)+ST)/R)
       KA(4)=((2*((A+H*KA(3))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+H*KA(3))*(1-ES**2)+ST)/R)
       AT = A + (H/6.)* (KA(1) + 2. *KA(2) +2.*KA(3) +KA(4))
       A= AT
C      WRITE(2,*)'F(1)=      ',F(1)
C      WRITE(2,*)'KA(1)=     ',KA(1)
C      WRITE(2,*)'KA(2)=      ',KA(2)
C      WRITE(2,*)'KA(3)=      ',KA(3)
C      WRITE(2,*)'KA(4)=     ',KA(4)
C      WRITE(2,*)'AT=      ',AT
C      WRITE(2,*)'A=     ',A
C
C*** MENGHITUNG EKSENTRISITAS E(T) ORBIT SATELIT ***
C
       F(2)=((((1-ES**2)**(.5))/(NA*A))*(S*SIN(FA)+(ST/ES)*
     +      ((A*A*(1-ES**2)-(R*R))/(R*A)))
       KE(1)= F(2)
       KE(2)=((((1-(ES+(.5)*H*F(2))**2)**(.5))/(NA*A))*(S*SIN(FA)+
     +      (ST/(ES+(.5)*H*F(2)))*((A*A*(1-(ES+(.5)*H*F(2))**2)-(R*R))
     +      /(R*A)))
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```
      KE(3)=(((1-(ES+(.5)*H*KE(2))**2)**(.5))/(NA*A))*(S*SIN(FA)+
     +      (ST/(ES+(.5)*H*KE(2)))*((A*A*(1-(ES+(.5)*H*KE(2))**2)-
     +      (R*R))/(R*A)))
      KE(4)=(((1-(ES+H*KE(3))**2)**(.5))/(NA*A))*(S*SIN(FA)+
     +      (ST/(ES+H*KE(3)))*((A*A*(1-(ES+H*KE(3))**2)-(R*R))/(R*A)))
      ET = ES +(H/6.)*(KE(1)+2.*KE(2)+2.*KE(3)+KE(4))
      ES= ET
C      WRITE(2,*)'F(2)=       ',F(2)
C      WRITE(2,*)'KE(1)=   ',KE(1)
C      WRITE(2,*)'KE(2)=     ',KE(2)
C      WRITE(2,*)'KE(3)=      ',KE(3)
C      WRITE(2,*)'KE(4)=      ',KE(4)
C      WRITE(2,*)'ET=       ',ET
C      WRITE(2,*)'ES=    ',ES
C
C*** MENGHITUNG INKLINASI L(T) ORBIT SATELIT ***
C
      F(3)=(W*R*COS(B-Q+FA))/((MIU*A*(1-ES**2))**(.5))
      KL(1)= F(3)
      KL(2)=((2*((A+(.5)*H*F(1))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*F(1))*(1-ES**2)*ST)/R)
      KL(3)=((2*((A+(.5)*H*KA(2))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*KA(2))*(1-ES**2)*ST)/R)
      KL(4)=((2*((A+H*KA(3))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+H*KA(3))*(1-ES**2)*ST)/R)
      LT =  L+ H*F(3)
      L= LT-(INT(LT/360)*360)
C      WRITE(2,*)'F(3)=      ',F(3)
C      WRITE(2,*)'LT=      ',LT
C      WRITE(2,*)'L=    ',
C
C*** MENGHITUNG ASENSIOREKTA OF ASCENDING NODE Q(T) ORBIT SATELIT ***

C
      F(4)=(W*R*SIN(B-Q+FA))/(((MIU*A*(1-ES**2))**(.5))*SIN(L))
      KQ(1)= F(4)
      KQ(2)= (W*R*SIN(B-(Q+(.5)*H*F(4))+FA))/(((MIU*A*(1-ES**2))**
     +      (.5))*SIN(L))
      KQ(3)=(W*R*SIN(B-(Q+(.5)*H*KQ(2))+FA))/(((MIU*A*(1-ES**2))**
     +      (.5)))*SIN(L))
      KQ(4)=(W*R*SIN(B-(Q+H*KQ(3))+FA))/(((MIU*A*(1-ES**2))**(.5))
     +      *SIN(L))
      QT = Q +H/6.*(KQ(1)+2.*KQ(2)+2.*KQ(3)+KQ(4))
      Q = QT-(INT(QT/360)*360)
C      WRITE(2,*)'F(4)=      ',F(4)
C      WRITE(2,*)'KQ(1)=     ',KQ(1)
C      WRITE(2,*)'KQ(2)=     ',KQ(2)
C      WRITE(2,*)'KQ(3)=    ',KQ(3)
C      WRITE(2,*)'KQ(4)=     ',KQ(4)
C      WRITE(2,*)'QT=    ',QT
C      WRITE(2,*)'Q=    ',Q
C
C*** MENGHITUNG LONGITUDE OF PERIGEE B(T) ORBIT SATELIT ***
C
      F(5)=(((A*(1-ES**2))**(.5))/(ES*(MIU**(.5))))*(-S*COS(FA)+ST*
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```
     +      (1+R/(A*(1-ES**2)))*SIN(FA))+2*F(4)*((SIN((.5)*L))**2)
      KB(1)= F(5)
      KB(2)=((2*((A+(.5)*H*F(1))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*F(1))*(1-ES**2)*ST)/R)
      KB(3)=((2*((A+(.5)*H*KA(2))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+(.5)*H*KA(2))*(1-ES**2)*ST)/R)
      KB(4)=((2*((A+H*KA(3))**(1.5)))/((MIU*(1-ES**2))**(.5)))
     +      *(S*ES*SIN(FA)+((A+H*KA(3))*(1-ES**2)*ST)/R)
      BT = B + H*F(5)
      B= BT-(INT(BT/360)*360)
C      WRITE(2,*)'F(5)=    ',F(5)
C      WRITE(2,*)'BT=    ',BT
C      WRITE(2,*)'B=  ',B
C
C*** MENGHITUNG MEAN LONGITUDE AT THE EPOCH ***
C
      F(6)=((ES**2)/(1+((1-ES**2)**(.5))))*F(5)*2*F(4)*((1-ES**2)**(.5))
     +     *((SIN((.5)*L))**2)-(2*R*6)/((MIU*A)**(.5))
      KC(1)= F(6)
      KC(2)= (W*R*SIN(B-(Q+(.5)*H*F(4))+FA))/(((MIU*A*(1-ES**2))**
     +       (.5))*SIN(L))
      KC(3)=(W*R*SIN(B-(Q+(.5)*H*KQ(2))+FA))/(((MIU*A*(1-ES**2))**
     +      (.5))*SIN(L))
      KC(4)=(W*R*SIN(B-(Q+H*KQ(3))+FA))/(((MIU*A*(1-ES**2))**(.5))
     +       *SIN(L))
      CT = C + H*F(6)
      C= CT-(INT(CT/360)*360)
C      WRITE(2,*)'F(6)=    ',F(6)
C      WRITE(2,*)'CT=  ',CT
C      WRITE(2,*)'C=    ',C
C
   40 CONTINUE
C
C*** MENCETAK HASILNYA ***
C
      A=A
      ES=ES
      L=L*(PI/180.)
      Q=Q*(PI/180.)
      B=B*PI/180.)

      WQ=B-Q
      WQ=WQ-(INT(WQ/360)*360)
      C=C
      WRITE(*,105)NO,A,ES,L,Q,WQ,C
      IF ( PILIH.EQ.1) THEN
          WRITE(2,*)NO,A,ES,L
      ELSEIF ( PILIH.EQ.2) THEN
          WRITE(2,*)NO,Q,WQ,C
      ENDIF
C
C*** MERUBAH DERAJAT KE RADIAN****
C
      L=L*(PI/180.)
      Q=Q*(PI/180.)
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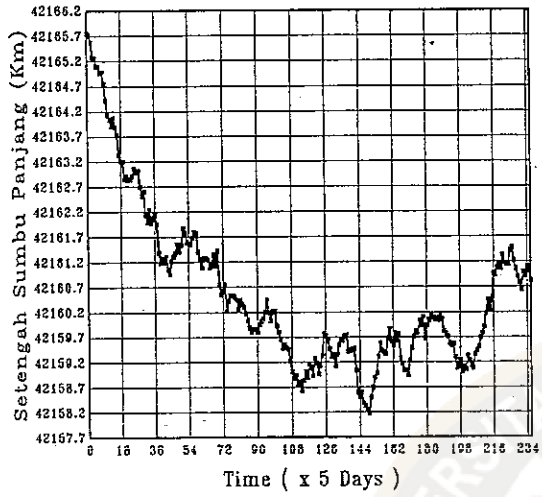
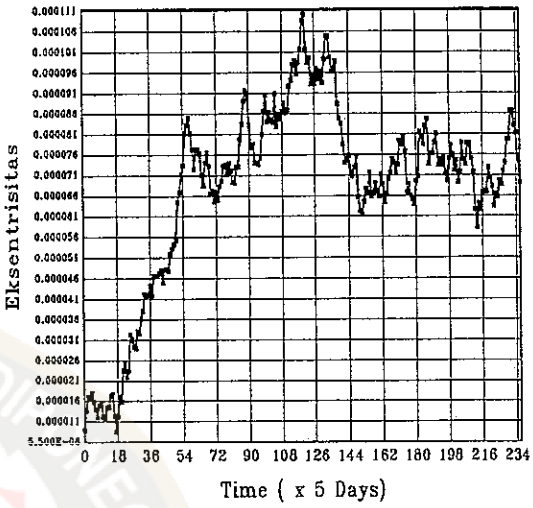
      B=B*(PI/180.)
C      WRITE(2,*)'L=   ',L,'Q=   ',Q,'B=   ',B
C
      NO=NO+1
   30 CONTINUE
C
C*** FORMAT KELUARAN HASIL DARI RUNGE-KUTTA ***
C
  100 FORMAT( /, '     HASIL KELUARAN MEMAKAI METODE RUNGE-KUTTA',//,'
     +NO      A          EB          L          Q          WQ          C')
  102 FORMAT(/,'       HASIL KELUARAN MEMAKAI METODE RUNGE-KUTTA',//,'
     +        NO              A                EB             L  ')
  103 FORMAT(/,'       HASIL KELUARAN MEMAKAI METODE RUNGE-KUTTA',//,'
     +        NO               Q               WQ             C  ')
  105 FORMAT(1X,I5,1X,E10.5,1X,E10.5,1X,E10.5,1X,E10.5,1X,E10.5,
     +        1X,E10.5,1X,E10.5)
   20 CONTINUE
   10 CONTINUE
      CLOSE(2)
      CLOSE(1)
      END
C
C***SUBROUTINE MNEWTON UNTUK MENGHITUNG ECCENTRICITY ANOMALY(EA)***
C            *** RUMUS METODE NEWTON ***
C         F(X) = 0
C         X(n+1) = X(n) - (F(Xn)/F'(Xn))
C*** METODE NEWTON DENGAN ACCELERATED CONVERGENCE ***
C         D(n)1 = - F(Xn)/F'(Xn)
C         D(n)2 = - F(Xn)/(F'(Xn) + (1/2)* D(n)1 * F''(Xn))
C         D(n)3 = - F(Xn)/(F'(Xn) + (1/2)* D(n)2 * F''(Xn) +
C                   (1/6)* D(n)2 * D(n)2 * F'''(Xn))
C         DST.
C
C         X(n+1) = X(n) + D(n)3
C    DIMANA:
C         n = BANYAKNYA ITERASI
C
      SUBROUTINE MNEWTON(E,MA,K,PI,EA)
C
      IMPLICIT REAL(A-D,F-Q,K-N,P-S,W-Z)
C
C***MENGHITUNG NILAI AWAL EA ***
C
      ML=MA-INT(MA/(2*PI))*(2*PI)
      SIGMA=SIN(ML*(PI/180.))
      K=SIGN(K,SIGMA)
      EA=ML+K*E
C      WRITE(2,*)'ML=   ',ML,'SIGMA=   ',SIGMA,'K=   ',K,'EA=   ',EA
C
C*** MULAI ITERASI ***
C
      NO=0
    5 LE=E*SIN(EA)
      FK=EA-LE-ML
C      WRITE(2,*)'NO=    ',NO,'LE=    ',LE,'FK=    ',FK
```

```
C
C*** MENGHITUNG TURUNAN F(EA) ***
C
      EC=E*COS(EA)
      ML=MA-INT(MA/(2*PI))*(2*PI)
      SIGMA=SIN(ML*(PI/180.))
      K=SIGN(K;SIGMA)
      FPK=1.0-EC
      FPP=LE
      FPPP=EC
C
C*** METODE NEWTON WITH ACCELERATION ***
C
      DEA=-FK/FPK
      DEA=-FK/(FPK+DEA*FPP/2.0)
      DEA=-FK/(FPK+DEA*FPP/2.0+DEA*DEA*FPPP/6.0)
C      WRITE(2,*)'DEA=   ',DEA
C
C*** MENGHITUNG NILAI EA ****
C
      EAK=EA+DEA
C      WRITE(2,*)'EAK=   ',EAK
      NC=NC+1
      EA=EAK
C      WRITE(2,*)'EA=   ',EA
      IF((DEA.GT.0.000001).OR.(NC.GT.10)) GO TO 5
      EA = EA
C
      END
C
C               SELAMAT MENGERJAKAN
```

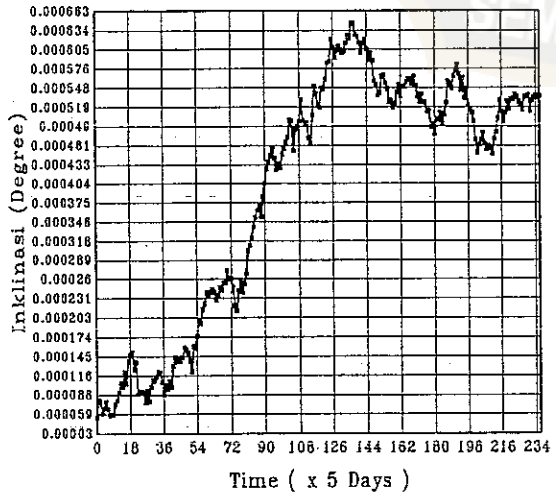
LAMPIRAN 2 : GRAFIK PERAMBATAN PARAMETER-PARAMETER ORBIT SATELIT **PALAPA B2P** DAN **SATELIT NAVIGASI**



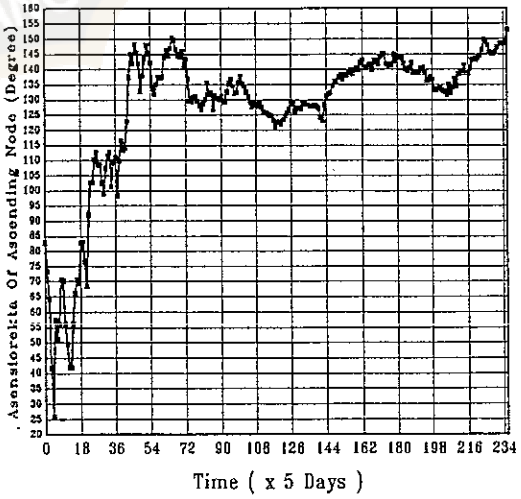
GRAFIK 1. Perambatan Setengah Sumbu Panjang Satelit Palapa B2P terhadap waktu selama 3 tahun



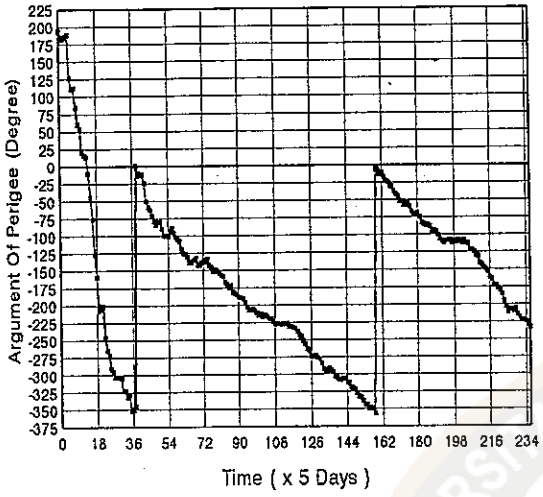
GRAFIK 2. Perambatan Eksentrisitas Satelit Palapa B2P terhadap waktu selama 3 tahun



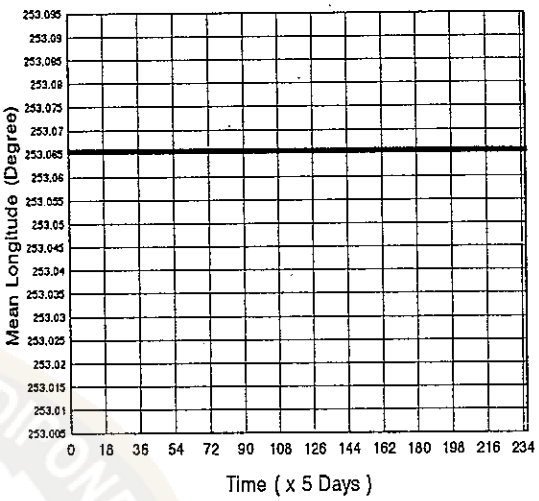
GRAFIK 3.Perambatan Inklinasi Satelit Palapa B2P terhadap waktu selama 3 tahun



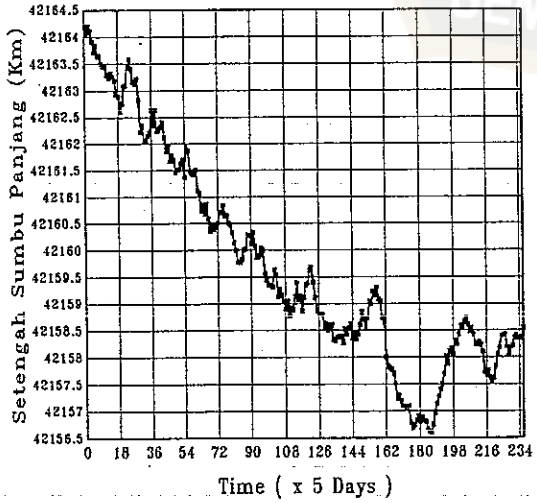
GRAFIK 4. Perambatan Asensiorekta Of Ascending Node Satelit Palapa B2P terhadap waktu selama 3 tahun



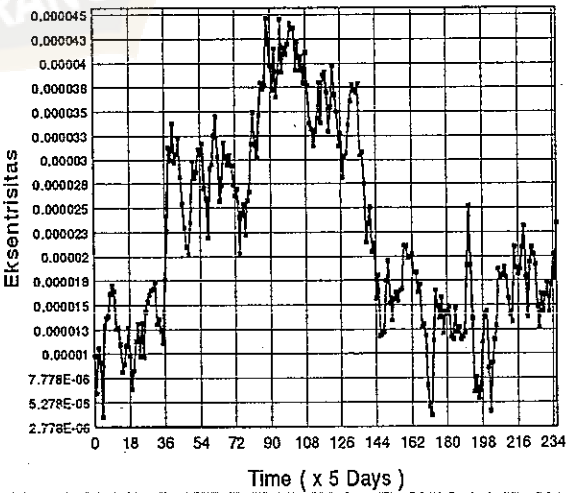
GRAFIK 5. Perambatan Argument Of Perigee Satelit Palapa B2P terhadap waktu selama 3 tahun



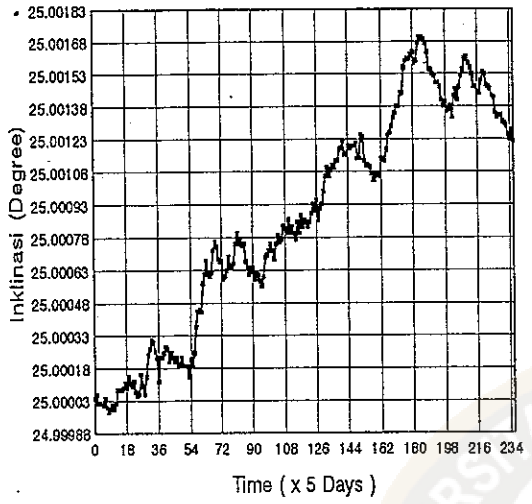
GRAFIK 6. Perambatan Mean Longitude Satelit Palapa B2P terhadap waktu selama 3 tahun



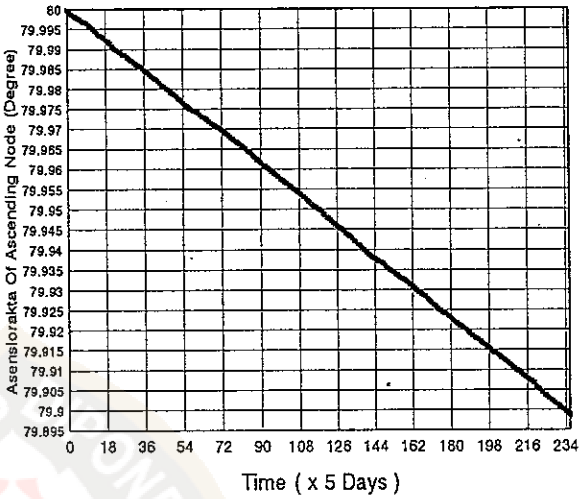
GRAFIK 7. Perambatan Setengah Sumbu Panjang Satelit Navigasi terhadap waktu selama 3 tahun



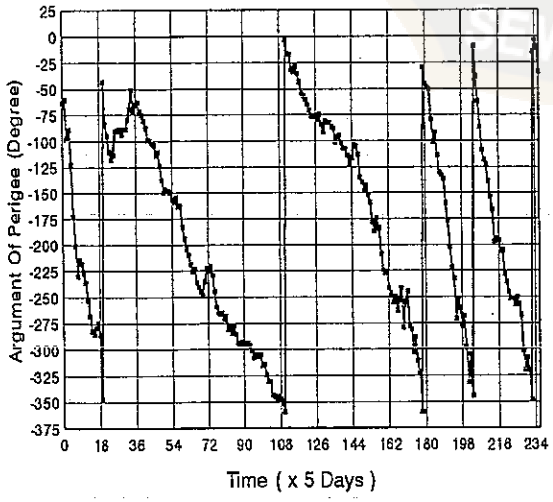
GRAFIK 8. Perambatan Eksentrisitas Satelit Navigasi terhadap waktu selama 3 tahun



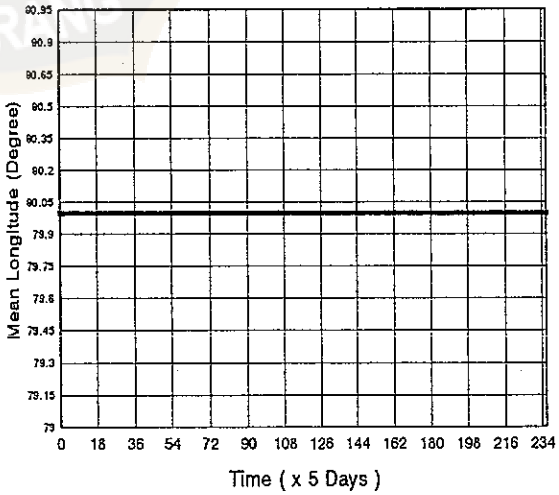
GRAFIK 9. Perambatan Inklinasi Satelit Navigasi terhadap waktu selama 3 tahun



GRAFIK 10. Perambatan Asensiorekta Of Ascending Node Satelit Navigasi terhadap waktu selama 3 tahun



GRAFIK 11. Perambatan Argument Of Perigee Satelit Navigasi terhadap waktu selama 3 tahun



GRAFIK 12. Perambatan Mean Longitude Satelit Navigasi terhadap waktu selama 3 tahun