

Assignment 5

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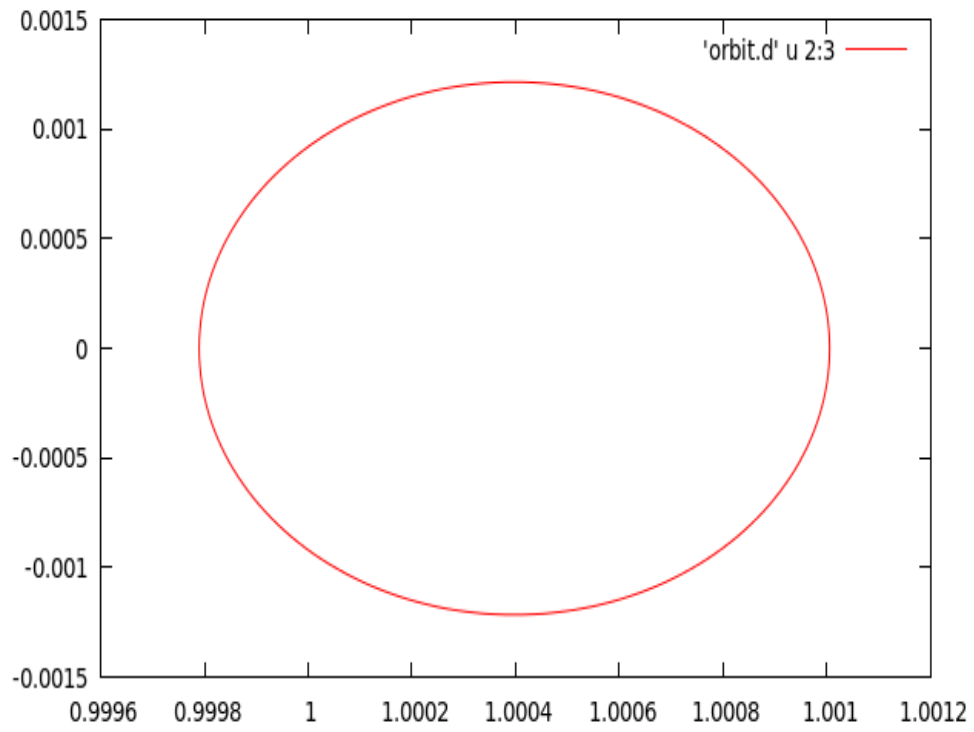
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1 Plot

Perdioidic orbit (x,y)



2 Outputs

2.1 idir=+1

```
henry.mauricio.ortiz@fme-desktop:~/Desktop$ ./main_rtbp_flow
mu
9.538750000000000E-004
Initial condition x(1),x(2),x(3),x(4)
.1001005021494284E+01,0,0,-.1215976572734674E-02
ti,np (number of points)
0,100
idir (1 or -1)
1
0.0000000000000000          initial t, initial cond:
1.0010050214942841          0.0000000000000000
0.0000000000000000          -1.2159765727346740E-003
6.2779540788778050          final t, final point:
1.0010050214942869          -4.9694609863780437E-013
-1.5562634595725142E-013    -1.2159765727387431E-003
```

2.2 idir=-1

```
henry.mauricio.ortiz@fme-desktop:~/Desktop$ ./main_rtbp_flow
mu
9.538750000000000E-004
Initial condition x(1),x(2),x(3),x(4)
.1001005021494284E+01,0,0,-.1215976572734674E-02
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0.0000000000000000          -1.2159765727346740E-003
-6.2779540788778050          final t, final point:
1.0010050214942869          4.9694609863780437E-013
1.5562634595725142E-013    -1.2159765727387431E-003
```

3 MAIN-RTBP-FLOW CODE

```
C*****
C
C   MAIN_RTBP_FLOW.f
C
C       We integrate the Restricted Three Body Problem field with Taylor
C       from t=ti up to t=tmax
C       idir= +1 (integration forward in time); =-1 (backward)
C       np= number of intermediate points (apart from the initial one)
C           that we want to write on the file orbit.d. If np=1
C           only the initial and final points are written
C
C   input: xi,ti,idir,np
C*****
      implicit real*8 (a-h,o-z)
      parameter (n=4)
      dimension xi(n),x(n)
      common/param/xmu
      write(*,*) 'muu'
      read(*,*) xmu
      open(10,file='orbit.d',status='unknown')
      write(*,*) 'Initial conditions x(1),x(2),x(3),x(4)'
      read(*,*) (xi(i),i=1,n)
      write(*,*) 'ti,np (number of points)'
      read(*,*)ti,np
      tmax=-2*.3138977039438897d+01
      call jac(xi,c_in,n)
      write(*,*)c_in
write(*,*) 'idir (1 or -1)'
      read(*,*) idir

      do i=1,n
         x(i)=xi(i)
      enddo
      write(*,*)ti,'   initial t, initial cond:'
```

```

        write(*,*)(x(i),i=1,n)
xinctime=dabs(tmax-ti)/np
        write (10,*)ti,(x(ii),ii=1,n),c_in
do 20 i=1,np
        call flow(ti,n,x,idir,xinctime)
        write (10,*)ti,(x(ii),ii=1,n),c
        call jac(x,c,n)
dif = dabs(c-c_in)
        write(*,*)'diff'
        write(*,*)dif
        if (dif.gt.1.D-11)then
write(*,*)c
write(*,*)'problem in first integral'
stop
endif
20    continue

        write(*,*)c
write(*,*)ti,' final t, final point:'
write(*,*)(x(i),i=1,n)
        end

        subroutine jac(x,c,n)

        IMPLICIT REAL*8(A-H,O-Z)
        dimension x(n)
        common/param/xmu
r1=dsqrt((x(1)-xmu)*(x(1)-xmu)+ x(2)*x(2))
r2=dsqrt((x(1)-xmu+1.d0)*(x(1)-xmu+1.d0)+ x(2)*x(2))
        c = 2.d0*(0.5d0*(x(1)*x(1) + x(2)*x(2)) + ((1.d0-xmu)/r1)
.      + (xmu/r2) + 0.5d0*(1.d0-xmu)*xmu) -x(3)*x(3) -x(4)*x(4)
return
        end

        subroutine flow(t,n,x,idir,xinctemps)
        IMPLICIT REAL*8 (A-H,O-Z)
        dimension x(n)
        tmax=t+idir*xinctemps

```

```
hab=0.1e-16
hre=0.1e-16
pabs=dlog10(hab)
prel=dlog10(hre)
istep=1
ht=0.d0
1      CALL taylor_f77_eq_rtbp_(t,x,idir,istep,pabs,prel,
& tmax,ht,iordre,ifl)
      if (idir.eq.1.and.t.lt.tmax)go to 1
      if (idir.eq.-1.and.t.gt.tmax)go to 1
      if (dabs(t-tmax).le.1.d-13)return
      write(*,*)'problems in taylor'
      stop
      return
      end
```

4 Test on determinant

Here is printed some of the results of the check of the jacobi determinant test, which is the difference between

```
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0,100
idir (1 or -1)
1
0.0000000000000000          initial t, initial cond:
1.0010050214942841          0.0000000000000000
0.0000000000000000          -1.2159765727346740E-003
diff
0.0000000000000000
diff
0.0000000000000000
diff
0.0000000000000000
diff
4.4408920985006262E-016
diff
0.0000000000000000
.
.
.
diff
4.4408920985006262E-016
diff
0.0000000000000000
diff
0.0000000000000000
diff
0.0000000000000000
```



```
diff
  0.000000000000000000
diff
  0.000000000000000000
diff
  0.000000000000000000
diff
  0.000000000000000000
diff
  0.000000000000000000
  6.2779540788778050      final t,  final point:
  1.0010050214942869      -4.9694609863780437E-013
-1.5562634595725142E-013 -1.2159765727387431E-003
```