Assignment 8

Henry Mauricio Ortiz Osorio

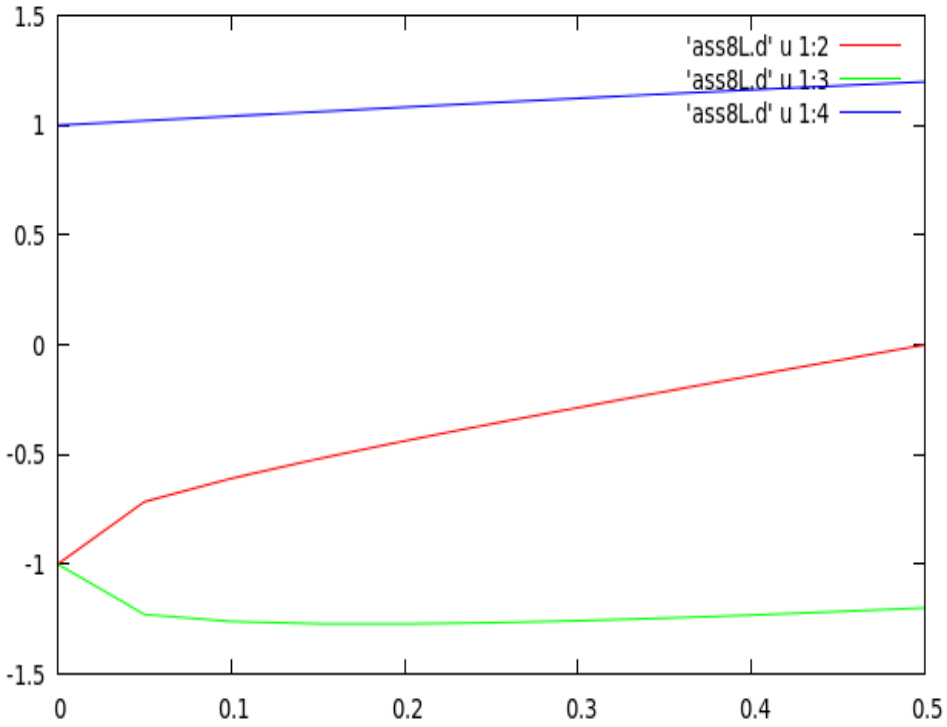
May, 2015

Contents

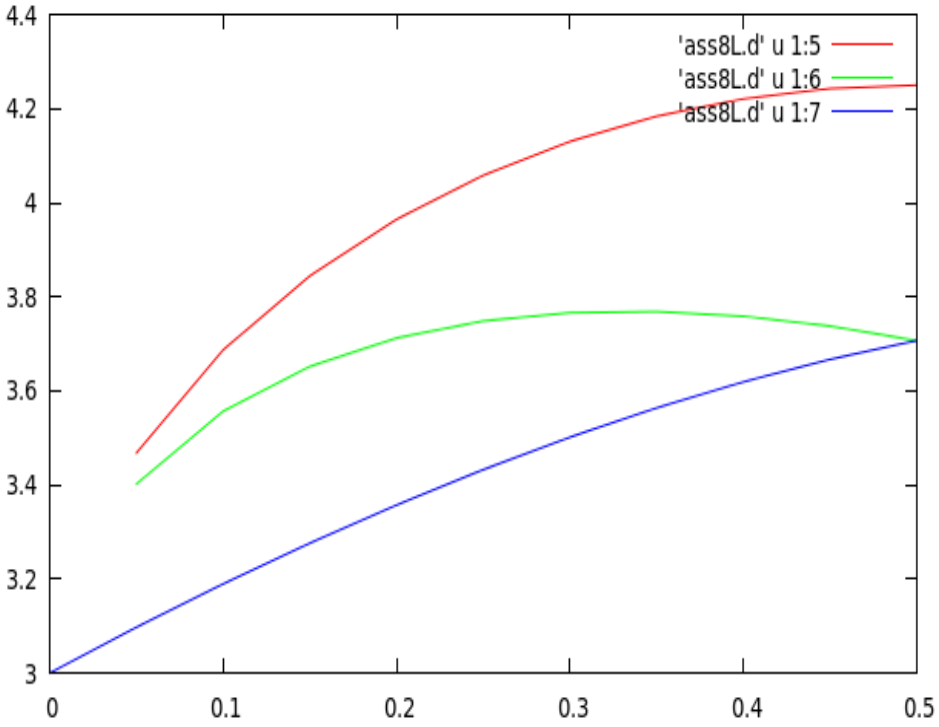
1 PLOTS

Plots for xmu=0,1 and xmu=0,2 variating between $(0, 0.5]$

1.1 Plot 1: (xmu=0,1)



1.2 Plot 2: (xmu=0,2)



2 Equilibrium points of the RTBP - CODE

```
c
c You must write 2 parts of the code:
c
c 1. main program: enter as input: xmu,
c obtain as output xl1,xl2,xl3,Cl1,Cl2,Cl3
c Typical call to the routine for the computation of this output:
c 1) we compute L1,L2,L3
c 1 call peq(xmu,xl1,xl2,xl3,cl1,cl2,cl3)
c
c 2. A routine to compute the Jacobi integral 2*Omega(x,y)-(x'^2+y'^2)=C
c BUT for a collinear equilibrium point, it is simply
c C=2*Omega(x,0)
c
c
c
c
c routine to compute xl1,xl2,xl3,Cl2,Cl2,Cl3
c
       implicit real*8 (a-h,o-z)
       parameter (n=4)
       common/param/xmu
       dimension x(n)
       write(*,*) 'xmu'
       read(*,*) xmu
       open(10,file='ass8L.d',status='unknown')
       write(*,*) 'xmu_initial'
       read(*,*) xmu_in
       npoints=1000000

       do i=1,(npoints+1)
       dxmu=(0.5d0-xmu_in)/npoints
       xmu = xmu_in + (i-1)*dxmu
       call peq(xmu,xl1,xl2,xl3,cl1,cl2,cl3)
       go to 12
  12     continue
       enddo
```

```
      write(*,*) 'xl1,xl2,xl3'
      write(*,*) xl1,xl2,xl3
      write(*,*) 'cl1,cl2,cl3'
      write(*,*) cl1,cl2,cl3
       end

       subroutine peq(xmu,xl1,xl2,xl3,cl1,cl2,cl3)
       implicit real*8(a-h,o-z)
       n=4
       a=1.d0/3.d0
       i=0
c to compute L2 (on the left hand side of the small primary)
       x=xmu/(3.d0*(1.d0-xmu))
       x=x**a
   1     den=3.d0-2.d0*xmu+x*(3.d0-xmu+x)
       f=xmu*(1.d0+x)**2/den
       f=f**a
       x1=xmu-1.d0-x
       if (dabs(x-f).le.1.d-15)then
c CALL .... and compute C(L2)
         xl2=X1
           call jac(xl2,cl2,n)
           go to 3
       endif
       i=i+1
       x=f
       go to 1
   2     format(e25.16,',',e25.16,',',e25.16)
   3     continue
c
c L1 (between the primaries)
c
       i=0
       x=xmu/(3.d0*(1.d0-xmu))
       x=x**a
   10     den=3.d0-2.d0*xmu-x*(3.d0-xmu-x)
       f=xmu*(1.d0-x)**2/den
       f=f**a
```

```
       x1=xmu-1.d0+x
       if (dabs(x-f).le.1.d-15)then
c CALL .... and compute C(L1)
       XL1=X1
          call jac(xl1,cl1,n)
          go to 4
       endif
       i=i+1
       x=f
       go to 10
    4     continue
c
c L3 (on the right hand side of the big primary)
c
       i=0
       x=1.d0 - (7.d0/12.d0)*xmu
   11    den=1.d0 + 2*xmu + x*(2+xmu+x)
       f=(1-xmu)*(1.d0+x)**2/den
       f=f**a
       x1=xmu+x
       if (dabs(x-f).le.1.d-15)then
          xl3=x1
          call jac(xl3,cl3,n)
          go to 5
       endif
       i=i+1
       x=f
       go to 11
    5   continue
       return
       end

       subroutine jac(x,c,n)
       IMPLICIT REAL*8(A-H,O-Z)
       common/param/xmu

     r1=dsqrt((x-xmu)*(x-xmu))
r2=dsqrt((x-xmu+1.d0)*(x-xmu+1.d0))
```

```
      c = 2.d0*(0.5d0*(x*x) + ((1.d0-xmu)/r1)
     .  + (xmu/r2) + 0.5d0*(1.d0-xmu)*xmu)
      return
      end
```