Apéndice
FUNCIONES DE MATLAB

programa.m

```
clear all
syms x

% vamos a pedir ahora los valores de los parametros
% lo haremos llamando a la funcion valores.
[valmu,ro,rc]=valores;

valores_de_mu=valmu'
frecuencias_naturales=(valmu.^2)'

% desplazamiento inicial
% cubico -0.5*x.^3+1.5*x.^2
D=inline('-0.5*x.^3+1.5*x.^2')
%cuadratico seria -x.^4/21+(4/21)*x.^3+(18/21)*x.^2


% Tratando el sistema como no ortogonal
% Vamos a hallar los distintas integrales que hacen falta

% long lo hemos llamado al numero de coeficientes que sacara el programa
long=20;
for i=1:long
   for j=1:long
      U(i,j)=quad(inline((((cos(valmu(i))+cosh(valmu(i))).*(sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i).*x)-...
   sinh(valmu(i).*x))-cos(valmu(i).*x)+cosh(valmu(i).*x))).*(cos(j*pi).*((cos(valmu(j))+cosh(valmu(j))).*(sin(valmu(j))+...
   sinh(valmu(j))).*(sin(valmu(j).*x)-sinh(valmu(j).*x))-cos(valmu(j).*x)+cosh(valmu(j).*x)))),0,1);
end
end


for i=1:long
   P(i)=quad(inline(D(x)*((cos(valmu(i))+cosh(valmu(i))).*...
   (sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i)*x)-sinh(valmu(i)*x))-cos(valmu(i)*x)+cosh(valmu(i)*x))),0,1);
end


% Resolvemos

for i=1:long
  A=U(1:i,1:i)\P(1:i)';
  [L,l]=size(A);
  for j=1:L
   a(j,i)=A(j);
end
end
a
A=a(:,L);
An=A

% LA PELICULA
% en este vector de tiempos es donde hay que tocar para que se vea mejor la
% vibracion.
t=[0:0.001:0.01];

x=[0:0.00001:1];
for i=1:length(t)
 y=-A(1)*cos((valmu(1)^2)*t(i)-pi)*((cos(valmu(1))+cosh(valmu(1)))/(sin(valmu(1))+sinh(valmu(1)))*(sin(valmu(1).*x)...
     -sinh(valmu(1).*x))-cos(valmu(1).*x)+cosh(valmu(1).*x))-A(2)*cos((valmu(2)^2)*t(i)-2*pi)*...
```

```
    ((cos(valmu(2))+cosh(valmu(2)))/(sin(valmu(2))+sinh(valmu(2)))*(sin(valmu(2)*x)-sinh(valmu(2)*x))-...
    cos(valmu(2)*x)+cosh(valmu(2)*x))-A(3)*...
    cos((valmu(3)^2)*t(i)-3*pi)*((cos(valmu(3))+cosh(valmu(3)))/(sin(valmu(3))+sinh(valmu(3)))*(sin(valmu(3)*x)-...
    sinh(valmu(3)*x))-cos(valmu(3)*x)+cosh(valmu(3)*x))-A(4)*...
    cos((valmu(4)^2)*t(i)-4*pi)*((cos(valmu(4))+cosh(valmu(4)))/(sin(valmu(4))+sinh(valmu(4)))*(sin(valmu(4)*x)-...
    sinh(valmu(4)*x))-cos(valmu(4)*x)+cosh(valmu(4)*x))-A(5)*...
    cos((valmu(5)^2)*t(i)-5*pi)*((cos(valmu(5))+cosh(valmu(5)))/(sin(valmu(5))+sinh(valmu(5)))*(sin(valmu(5)*x)-...
    sinh(valmu(5)*x))-cos(valmu(5)*x)+cosh(valmu(5)*x))-A(6)*...
    cos((valmu(6)^2)*t(i)-6*pi)*((cos(valmu(6))+cosh(valmu(6)))/(sin(valmu(6))+sinh(valmu(6)))*(sin(valmu(6)*x)-...
    sinh(valmu(6)*x))-cos(valmu(6)*x)+cosh(valmu(6)*x))-A(7)*...
    cos((valmu(7)^2)*t(i)-7*pi)*((cos(valmu(7))+cosh(valmu(7)))/(sin(valmu(7))+sinh(valmu(7)))*(sin(valmu(7)*x)-...
    sinh(valmu(7)*x))-cos(valmu(7)*x)+cosh(valmu(7)*x))-A(8)*...
    cos((valmu(8)^2)*t(i)-8*pi)*((cos(valmu(8))+cosh(valmu(8)))/(sin(valmu(8))+sinh(valmu(8)))*(sin(valmu(8)*x)-...
    sinh(valmu(8)*x))-cos(valmu(8)*x)+cosh(valmu(8)*x))-A(9)*...
    cos((valmu(9)^2)*t(i)-9*pi)*((cos(valmu(9))+cosh(valmu(9)))/(sin(valmu(9))+sinh(valmu(9)))*(sin(valmu(9).*x)-...
    sinh(valmu(9).*x))-cos(valmu(9).*x)+cosh(valmu(9).*x))-A(10)*...
    cos((valmu(10)^2)*t(i)-10*pi)*((cos(valmu(10))+cosh(valmu(10)))/(sin(valmu(10))+sinh(valmu(10)))*...
    (sin(valmu(10).*x)-sinh(valmu(10).*x))-cos(valmu(10).*x)+cosh(valmu(10).*x))-A(11)*...
    cos((valmu(11)^2)*t(i)-11*pi)*((cos(valmu(11))+cosh(valmu(11)))/(sin(valmu(11))+sinh(valmu(11)))*...
    (sin(valmu(11).*x)-sinh(valmu(11).*x))-cos(valmu(11).*x)+cosh(valmu(11).*x))-A(12)*...
    cos((valmu(12)^2)*t(i)-12*pi)*((cos(valmu(12))+cosh(valmu(12)))/(sin(valmu(12))+sinh(valmu(12)))*...
    (sin(valmu(12).*x)-sinh(valmu(12).*x))-cos(valmu(12).*x)+cosh(valmu(12).*x));
 plot(x,y);
  axis([0,1,-1,1]);
 M(:,i)=getframe;
end
movie(M,1,15);

% MOVIMIENTO DEL EXTREMO
% Aqui podriamos volver a tocar el rango de t
t=[0:0.0001:5];

y=-A(1)*cos((valmu(1)^2)*t-pi)*((cos(valmu(1))+cosh(valmu(1)))/(sin(valmu(1))+sinh(valmu(1)))*(sin(valmu(1))...
    -sinh(valmu(1)))-cos(valmu(1))+cosh(valmu(1)))-A(2)*cos((valmu(2)^2)*t-2*pi)*((cos(valmu(2))+cosh(valmu(2)))...
    /(sin(valmu(2))+sinh(valmu(2)))*(sin(valmu(2))-sinh(valmu(2)))-cos(valmu(2))+cosh(valmu(2)))-A(3)*...
    cos((valmu(3)^2)*t-3*pi)*((cos(valmu(3))+cosh(valmu(3)))/(sin(valmu(3))+sinh(valmu(3)))*(sin(valmu(3))-...
    sinh(valmu(3)))-cos(valmu(3))+cosh(valmu(3)))-A(4)*...
    cos((valmu(4)^2)*t-4*pi)*((cos(valmu(4))+cosh(valmu(4)))/(sin(valmu(4))+sinh(valmu(4)))*(sin(valmu(4))-...
    sinh(valmu(4)))-cos(valmu(4))+cosh(valmu(4)))-A(5)*...
    cos((valmu(5)^2)*t-5*pi)*((cos(valmu(5))+cosh(valmu(5)))/(sin(valmu(5))+sinh(valmu(5)))*(sin(valmu(5))-...
    sinh(valmu(5)))-cos(valmu(5))+cosh(valmu(5)))-A(6)*...
    cos((valmu(6)^2)*t-6*pi)*((cos(valmu(6))+cosh(valmu(6)))/(sin(valmu(6))+sinh(valmu(6)))*(sin(valmu(6))-...
    sinh(valmu(6)))-cos(valmu(6))+cosh(valmu(6)))-A(7)*...
    cos((valmu(7)^2)*t-7*pi)*((cos(valmu(7))+cosh(valmu(7)))/(sin(valmu(7))+sinh(valmu(7)))*(sin(valmu(7))-...
    sinh(valmu(7)))-cos(valmu(7))+cosh(valmu(7)))-A(8)*...
    cos((valmu(8)^2)*t-8*pi)*((cos(valmu(8))+cosh(valmu(8)))/(sin(valmu(8))+sinh(valmu(8)))*(sin(valmu(8))-...
    sinh(valmu(8)))-cos(valmu(8))+cosh(valmu(8)))-A(9)*...
    cos((valmu(9)^2)*t-9*pi)*((cos(valmu(9))+cosh(valmu(9)))/(sin(valmu(9))+sinh(valmu(9)))*(sin(valmu(9))-...
    sinh(valmu(9)))-cos(valmu(9))+cosh(valmu(9)))-A(10)*...
    cos((valmu(10)^2)*t-10*pi)*((cos(valmu(10))+cosh(valmu(10)))/(sin(valmu(10))+sinh(valmu(10)))*(sin(valmu(10))-...
    sinh(valmu(10)))-cos(valmu(10))+cosh(valmu(10)))-A(11)*...
    cos((valmu(11)^2)*t-11*pi)*((cos(valmu(11))+cosh(valmu(11)))/(sin(valmu(11))+sinh(valmu(11)))*(sin(valmu(11))-...
    sinh(valmu(11)))-cos(valmu(11))+cosh(valmu(11)))-A(12)*...
    cos((valmu(12)^2)*t-12*pi)*((cos(valmu(12))+cosh(valmu(12)))/(sin(valmu(12))+sinh(valmu(12)))*(sin(valmu(12))-...
    sinh(valmu(12)))-cos(valmu(12))+cosh(valmu(12)));

 plot(t,y)
  axis([0,5,-1,1.01]),xlabel('t'),ylabel('y'),
  pause(0.5)

% Ahora haremos la transformada rapida de fourier
figure
N=64;
T=1/128;
k=0:N-1;
f=A(1)*cos((valmu(1)^2)*k*T-pi)*((cos(valmu(1))+cosh(valmu(1)))/(sin(valmu(1))+sinh(valmu(1)))*(sin(valmu(1))...
    -sinh(valmu(1)))-cos(valmu(1))+cosh(valmu(1)))+A(2)*cos((valmu(2)^2)*k*T-
2*pi)*((cos(valmu(2))+cosh(valmu(2)))...
    /(sin(valmu(2))+sinh(valmu(2)))*(sin(valmu(2))-sinh(valmu(2)))-cos(valmu(2))+cosh(valmu(2)))+A(3)*...
```

```
    cos((valmu(3)^2)*k*T-3*pi)*((cos(valmu(3))+cosh(valmu(3)))/(sin(valmu(3))+sinh(valmu(3)))*(sin(valmu(3))-...
    sinh(valmu(3)))-cos(valmu(3))+cosh(valmu(3)))+A(4)*...
    cos((valmu(4)^2)*k*T-4*pi)*((cos(valmu(4))+cosh(valmu(4)))/(sin(valmu(4))+sinh(valmu(4)))*(sin(valmu(4))-...
    sinh(valmu(4)))-cos(valmu(4))+cosh(valmu(4)))+A(5)*...
    cos((valmu(5)^2)*k*T-5*pi)*((cos(valmu(5))+cosh(valmu(5)))/(sin(valmu(5))+sinh(valmu(5)))*(sin(valmu(5))-...
    sinh(valmu(5)))-cos(valmu(5))+cosh(valmu(5)))+A(6)*...
    cos((valmu(6)^2)*k*T-6*pi)*((cos(valmu(6))+cosh(valmu(6)))/(sin(valmu(6))+sinh(valmu(6)))*(sin(valmu(6))-...
    sinh(valmu(6)))-cos(valmu(6))+cosh(valmu(6)))+A(7)*...
    cos((valmu(7)^2)*k*T-7*pi)*((cos(valmu(7))+cosh(valmu(7)))/(sin(valmu(7))+sinh(valmu(7)))*(sin(valmu(7))-...
    sinh(valmu(7)))-cos(valmu(7))+cosh(valmu(7)))+A(8)*...
    cos((valmu(8)^2)*k*T-8*pi)*((cos(valmu(8))+cosh(valmu(8)))/(sin(valmu(8))+sinh(valmu(8)))*(sin(valmu(8))-...
    sinh(valmu(8)))-cos(valmu(8))+cosh(valmu(8)))+A(9)*...
    cos((valmu(9)^2)*k*T-9*pi)*((cos(valmu(9))+cosh(valmu(9)))/(sin(valmu(9))+sinh(valmu(9)))*(sin(valmu(9))-...
    sinh(valmu(9)))-cos(valmu(9))+cosh(valmu(9)))+A(10)*...
    cos((valmu(10)^2)*k*T-10*pi)*((cos(valmu(10))+cosh(valmu(10))))/(sin(valmu(10))+sinh(valmu(10)))*...
    (sin(valmu(10))-sinh(valmu(10)))-cos(valmu(10))+cosh(valmu(10)))+A(11)*...
    cos((valmu(11)^2)*k*T-11*pi)*((cos(valmu(11))+cosh(valmu(11))))/(sin(valmu(11))+sinh(valmu(11)))*...
    (sin(valmu(11))-sinh(valmu(11)))-cos(valmu(11))+cosh(valmu(11)))+A(12)*...
    cos((valmu(12)^2)*k*T-12*pi)*((cos(valmu(12))+cosh(valmu(12))))/(sin(valmu(12))+sinh(valmu(12)))*...
    (sin(valmu(12))-sinh(valmu(12)))-cos(valmu(12))+cosh(valmu(12)));
magF=abs(fft(f));
hertz=k*(1/(N*T));
plot(hertz(1:N/2),magF(1:N/2)),...
   xlabel('Hz'),ylabel('|F(k)|'),grid
 pause(0.5)


% Ahora dibujaremos las funciones i y d, para ver la funcion i donde tiene
% la asintota

figure
x=[0:0.0001:25];
y1=(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x));
y2=(ro*x.^3)./(rc^4-x.^4);
plot(x,y1,'k-',x,y2,'k-.')
xlabel('mu')
ylabel('f(mu)')
axis([0,25,-20,20]),title('los cortes entre ambas funciones son las frecuencias naturales')
pause(0.5)


% LOS MODOS DE VIBRACION
figure
x=[0:0.001:1];

y=-((cos(valmu(1))+cosh(valmu(1)))/(sin(valmu(1))+sinh(valmu(1)))*(sin(valmu(1).*x)...
     -sinh(valmu(1).*x))-cos(valmu(1).*x)+cosh(valmu(1).*x));
y2=-((cos(valmu(2))+cosh(valmu(2)))/(sin(valmu(2))+sinh(valmu(2)))*(sin(valmu(2).*x)...
     -sinh(valmu(2).*x))-cos(valmu(2).*x)+cosh(valmu(2).*x));
y3=-((cos(valmu(3))+cosh(valmu(3)))/(sin(valmu(3))+sinh(valmu(3)))*(sin(valmu(3).*x)...
    -sinh(valmu(3).*x))-cos(valmu(3).*x)+cosh(valmu(3).*x));
y4=-((cos(valmu(4))+cosh(valmu(4)))/(sin(valmu(4))+sinh(valmu(4)))*(sin(valmu(4).*x)...
     -sinh(valmu(4).*x))-cos(valmu(4).*x)+cosh(valmu(4).*x));
y5=-((cos(valmu(5))+cosh(valmu(5)))/(sin(valmu(5))+sinh(valmu(5)))*(sin(valmu(5).*x)...
     -sinh(valmu(5).*x))-cos(valmu(5).*x)+cosh(valmu(5).*x));
y6=-((cos(valmu(6))+cosh(valmu(6)))/(sin(valmu(6))+sinh(valmu(6)))*(sin(valmu(6).*x)...
     -sinh(valmu(6).*x))-cos(valmu(6).*x)+cosh(valmu(6).*x));
y7=-((cos(valmu(7))+cosh(valmu(7)))/(sin(valmu(7))+sinh(valmu(7)))*(sin(valmu(7).*x)...
     -sinh(valmu(7).*x))-cos(valmu(7).*x)+cosh(valmu(7).*x));
y8=-((cos(valmu(8))+cosh(valmu(8)))/(sin(valmu(8))+sinh(valmu(8)))*(sin(valmu(8).*x)...
     -sinh(valmu(8).*x))-cos(valmu(8).*x)+cosh(valmu(8).*x));

subplot(2,4,1);
plot(x,y),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,2);
plot(x,y2),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,3);
plot(x,y3),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,4);
```

```
plot(x,y4),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,5);
plot(x,y5),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,6);
plot(x,y6),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,7);
plot(x,y7),xlabel('x'),ylabel('y'),axis([0 1 -2 2])
subplot(2,4,8);
plot(x,y8),xlabel('x'),ylabel('y'),axis([0 1 -2 2])


% Grafica del decaimiento de los coeficientes
 figure
 v(1)=0;
 for j=2:long
    y1=1;
    v(j)=v(j-1)+y1;

 end
 v;

 plot(v,A),title('variacion de los coeficientes'),grid
```

valores.m

```
function [valmu,ro,rc]=valores

clear all
warning off MATLAB:divideByZero
format short g

ro=input('Dame el valor del parametro ro (=Mv*L/m)  ');
rc=input('Dame el valor del parametro raiz de r (=posicion de la asintota de la funcion polinomio)  ');
syms x

if ro<0
      ro=input('Dame un valor POSITIVO del parametro ro  ');
else
end
if rc<0
   rc=input( 'Dame un valor POSITIVO del parametro raiz de r ');
else
end

if rc<=1.87
   valmu(1)=fsolve(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),1.8751,optimset('Display','off'));
   valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
   valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
   valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
   valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
   valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
   valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
   valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
   valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
   valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
   valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
   valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
   valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
   valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
   valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
   valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
   valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
   valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
   valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
   valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%   valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%   valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%   valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%   valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%   valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%   valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
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```
elseif rc>1.88&rc<4.69
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.88,rc-0.0001]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,4.694]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
elseif rc>4.7&rc<7.85
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,rc-0.0001]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,7.854,]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
elseif rc>7.86&rc<10.99
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,rc-0.0001]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,10.99]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
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%       valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%       valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%       valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%       valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%       valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
    elseif rc>11&rc<14.13
        valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
        valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
        valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
        valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[10.997,rc-0.0001]);
        valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,14.136]);
        valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
        valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
        valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
        valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
        valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
        valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
        valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
        valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
        valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
        valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
        valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
        valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
        valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
        valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
        valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%       valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%       valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%       valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%       valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%       valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%       valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
    elseif rc>14.14&rc<17.27
        valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
        valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
        valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
        valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
        valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.138,rc-0.0001]);
        valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,17.277]);
        valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
        valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
        valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
        valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
        valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
        valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
        valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
        valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
        valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.5,45.4]);
        valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
        valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
        valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
        valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
        valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%       valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%       valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%       valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%       valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%       valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%       valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
    elseif rc>17.28&rc<20.418
        valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
        valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
        valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
        valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
        valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
        valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,rc-0.0001]);
        valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,20.419]);
        valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.422,23.56]);
        valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
        valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
        valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
        valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
        valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
        valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
        valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
        valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
        valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
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    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%   valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%   valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%   valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%   valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%   valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%   valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>20.423&rc<23.561
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,rc-0.0001]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,23.561]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.564,26.69]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%   valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%   valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%   valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%   valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%   valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%   valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>23.563&rc<26.7
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,rc-0.0001]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,26.69]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%   valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%   valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%   valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%   valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%   valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%   valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>26.71&rc<29.84
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,rc-0.0001]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,29.84]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
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    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>29.85&rc<32.98
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,rc-0.0001]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,32.98]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.2,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>33&rc<36.1
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.9]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,rc-0.0001]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,36.1]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.14,39.2]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
  elseif rc>36.2&rc<39.2
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
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    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.9]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.1]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.14,rc-0.0001]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,39.26]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.43,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);

        elseif rc>39.3&rc<42.35
    valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
    valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
    valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
    valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
    valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
    valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
    valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
    valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
    valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
    valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
    valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
    valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.13,39.26]);
    valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.27,rc-0.0001]);
    valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.001,42.4]);
    valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
    valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.58,48.6]);
    valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.76,51.78]);
    valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
    valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.05]);
    valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.2,61.2]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,80.1]);
%   elseif rc==80
%     valmu(1)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[1.8753,4.694]);
%     valmu(2)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[4.6943,7.8547]);
%     valmu(3)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[7.855,10.99]);
%     valmu(4)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[11,14.135]);
%     valmu(5)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[14.139,17.277]);
%     valmu(6)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[17.28,20.418]);
%     valmu(7)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[20.421,23.561]);
%     valmu(8)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[23.563,26.7]);
%     valmu(9)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[26.71,29.84]);
%     valmu(10)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[29.85,32.98]);
%     valmu(11)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[33,36.12]);
%     valmu(12)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[36.13,39.26]);
%     valmu(13)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[39.3,42.4]);
%     valmu(14)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[42.45,45.5]);
%     valmu(15)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[45.6,48.6]);
%     valmu(16)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[48.73,51.8]);
%     valmu(17)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[51.9,54.9]);
%     valmu(18)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[55,58.1]);
%     valmu(19)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[58.15,61.2]);
%     valmu(20)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[61.3,64.35]);
%     valmu(21)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[64.45,67.5]);
%     valmu(22)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[67.6,70.6]);
%     valmu(23)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[70.7,73.8]);
%     valmu(24)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[74,76.9]);
%     valmu(25)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[77,rc-0.0001]);
%     valmu(26)=fzero(inline((ro*(x.^3))./(rc^4-x.^4)-(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x))),[rc+0.0001,80.11]);
else
end
```

varia_ro.m

```
x=[0:0.00001:8];
y1=(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x));
ro=[0.5 2 20];
rc= 1.4 ;
for i=1:length(ro)
    y2=(ro(i)*x.^3)./(rc^4-x.^4);
    figure
    plot(x,y1,'k-',x,y2,'k-.')
    xlabel('mu')
    ylabel('f(mu)')
    axis([0,8,-10,10])

end
```

varia_r.m

```
x=[0:0.00001:8];
y1=(cos(x).*sinh(x)-cosh(x).*sin(x))./(1+cos(x).*cosh(x));
ro=4;
rc=[0.5 2.1 6.5 ];
for i=1:length(rc)
    y2=(ro*x.^3)./(rc(i)^4-x.^4);
    figure
    plot(x,y1,'k-',x,y2,'k-.')
    xlabel('mu')
    ylabel('f(mu)')
    axis([0,8,-10,10])
end
```

compara.m

```
clear all
syms x

% vamos a pedir ahora los valores de los parametros
% lo haremos llamando a la funcion valores.
[valmu,ro,rc]=valores;


valores_de_mu=valmu'
frecuencias_naturales=valmu.^2'

% desplazamiento inicial
% cubico -0.5*x.^3+1.5*x.^2
D=inline('-0.5*x.^3+1.5*x.^2')
%cuadratico seria -x.^4/21+(4/21)*x.^3+(18/21)*x.^2

% Tratando el sistema como no ortogonal
% Vamos a hallar los distintas integrales que hacen falta

% long lo hemos llamado al numero de coeficientes que sacara el programa
long=20;
for i=1:long
   for j=1:long
      U(i,j)=quad(inline((((cos(valmu(i))+cosh(valmu(i)))./(sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i).*x)-...
sinh(valmu(i).*x))-cos(valmu(i).*x)+cosh(valmu(i).*x))).*(cos(j*pi).*((cos(valmu(j))+cosh(valmu(j))./(sin(valmu(j))+...
   sinh(valmu(j))).*(sin(valmu(j).*x)-sinh(valmu(j).*x))-cos(valmu(j).*x)+cosh(valmu(j).*x)))),0,1);
end
end
```

```
for i=1:long
   P(i)=quad(inline(D(x)*((cos(valmu(i))+cosh(valmu(i))).*...
   (sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i)*x)-sinh(valmu(i)*x))-cos(valmu(i)*x)+cosh(valmu(i)*x))),0,1);
end


% Resolvemos
for i=1:long
  A=U(1:i,1:i)\P(1:i)';
  [L,l]=size(A);
  for j=1:L
   a(j,i)=A(j);
end
end
a
A=a(:,L);
A1=A;


 v1(1)=1;
 for j=2:long
    y1=1;
    v1(j)=v1(j-1)+y1;

 end
 v1;
 [valmu,ro,rc]=valores;


valores_de_mu=valmu'
frecuencias_naturales=valmu.^2'

% desplazamiento inicial
% cubico -0.5*x.^3+1.5*x.^2
D=inline('-0.5*x.^3+1.5*x.^2')
%cuadratico seria -x.^4/21+(4/21)*x.^3+(18/21)*x.^2

% Tratando el sistema como no ortogonal
% Vamos a hallar los distintas integrales que hacen falta

% long lo hemos llamado al numero de coeficientes que sacara el programa
long=20;
for i=1:long
   for j=1:long
      U(i,j)=quad(inline((((cos(valmu(i))+cosh(valmu(i))).*(sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i).*x)-...
sinh(valmu(i).*x))-cos(valmu(i).*x)+cosh(valmu(i).*x))).*(cos(j*pi).*((cos(valmu(j))+cosh(valmu(j))).*(sin(valmu(j))+...
   sinh(valmu(j))).*(sin(valmu(j).*x)-sinh(valmu(j).*x))-cos(valmu(j).*x)+cosh(valmu(j).*x)))),0,1);
end
end


for i=1:long
   P(i)=quad(inline(D(x)*((cos(valmu(i))+cosh(valmu(i))).*...
   (sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i)*x)-sinh(valmu(i)*x))-cos(valmu(i)*x)+cosh(valmu(i)*x))),0,1);
end


% Resolvemos
for i=1:long
  A=U(1:i,1:i)\P(1:i)';
  [L,l]=size(A);
  for j=1:L
   a(j,i)=A(j);
end
end
a
A=a(:,L);
A2=A;


 v2(1)=1;
 for j=2:long
    y1=1;
    v2(j)=v2(j-1)+y1;

 end
 v2;
```

```
[valmu,ro,rc]=valores;


valores_de_mu=valmu'
frecuencias_naturales=valmu.^2'

% desplazamiento inicial
% cubico -0.5*x.^3+1.5*x.^2
D=inline('-0.5*x.^3+1.5*x.^2')
%cuadratico seria -x.^4/21+(4/21)*x.^3+(18/21)*x.^2

% Tratando el sistema como no ortogonal
% Vamos a hallar los distintas integrales que hacen falta

% long lo hemos llamado al numero de coeficientes que sacara el programa
long=20;
for i=1:long
   for j=1:long
      U(i,j)=quad(inline((((cos(valmu(i))+cosh(valmu(i))).*(sin(valmu(i).*x)-...
sinh(valmu(i).*x))-cos(valmu(i).*x)+cosh(valmu(i).*x))).*(cos(j*pi).*((cos(valmu(j))+cosh(valmu(j))).*(sin(valmu(j))+...
   sinh(valmu(j))).*(sin(valmu(j).*x)-sinh(valmu(j).*x))-cos(valmu(j).*x)+cosh(valmu(j).*x)))),0,1);
end
end


for i=1:long
   P(i)=quad(inline(D(x)*((cos(valmu(i))+cosh(valmu(i))).*...
   (sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i)*x)-sinh(valmu(i)*x))-cos(valmu(i)*x)+cosh(valmu(i)*x))),0,1);
end


% Resolvemos
for i=1:long
  A=U(1:i,1:i)\P(1:i)';
  [L,l]=size(A);
  for j=1:L
   a(j,i)=A(j);
end
end
a
A=a(:,L);
A3=A;


v3(1)=1;
for j=2:long
    y1=1;
    v3(j)=v3(j-1)+y1;

end
v3;
[valmu,ro,rc]=valores;


valores_de_mu=valmu'
frecuencias_naturales=valmu.^2'

% desplazamiento inicial
% cubico -0.5*x.^3+1.5*x.^2
D=inline('-0.5*x.^3+1.5*x.^2')
%cuadratico seria -x.^4/21+(4/21)*x.^3+(18/21)*x.^2

% Tratando el sistema como no ortogonal
% Vamos a hallar los distintas integrales que hacen falta

% long lo hemos llamado al numero de coeficientes que sacara el programa
long=20;
for i=1:long
   for j=1:long
      U(i,j)=quad(inline((((cos(valmu(i))+cosh(valmu(i))).*(sin(valmu(i).*x)-...
sinh(valmu(i).*x))-cos(valmu(i).*x)+cosh(valmu(i).*x))).*(cos(j*pi).*((cos(valmu(j))+cosh(valmu(j))).*(sin(valmu(j))+...
   sinh(valmu(j))).*(sin(valmu(j).*x)-sinh(valmu(j).*x))-cos(valmu(j).*x)+cosh(valmu(j).*x)))),0,1);
end
end


for i=1:long
```

```
   P(i)=quad(inline(D(x)*((cos(valmu(i))+cosh(valmu(i))./...
   (sin(valmu(i))+sinh(valmu(i))).*(sin(valmu(i)*x)-sinh(valmu(i)*x))-cos(valmu(i)*x)+cosh(valmu(i)*x))),0,1);
end


% Resolvemos
for i=1:long
   A=U(1:i,1:i)\P(1:i)';
   [L,l]=size(A);
   for j=1:L
    a(j,i)=A(j);
end
end
a
A=a(:,L);
A4=A;


 v4(1)=1;
 for j=2:long
     y1=1;
     v4(j)=v4(j-1)+y1;

 end
 v4;

 plot(v1,A1,'b',v2,A2,'g+-.',v3,A3,'k*-',v4,A4,'ro--'),xlabel('n'),ylabel('An'),axis([1 20 -8 0.1])
 % azul el caso 1
 % verde el 2
 % negro el 3
 % rojo el 4
```