Apéndice D

Lista del programa del Filtro Tow Thomas y Bicuadrático

Apéndice D

Listado de Programa: Tow Thomas

```
function towthomaspb_OpeningFcn(hObject, eventdata, handles, varargin)
N = varargin{1};
TIPO = varargin{2};
global bandera
global Wnz

n = N;
    if TIPO == ' '
        if bandera == 0%%%Thomson
            set(handles.TagEditN,'string',num2str(N))
        else
            set(handles.TagEditN,'string',num2str(N*2))
        end
    else
         set(handles.TagEditN,'string',num2str(N))
    end



global poles
global Q
global Wn
global Wc
global handles

%%%metodo para sacar wn y Q
    if (bandera == 4|bandera ==1|bandera==3|bandera==0)%%%%%para el
caso de chebyshez inverso,eliptico, eliptico pasabanda
        global zeros
        global Wnz
        if (bandera == 1|bandera==3)
            global cero
            global polos
            if bandera ==1
                global num
                global den
                P = roots(den);
                Z = roots(num);
            elseif (bandera==3)
                P = polos;
                Z = cero;
            end
        else
            global zeros
            poles;
            zeros
            P = poles;
            Z = zeros;
        end
        Wn = sqrt(((real(P)).^2)+(imag(P).^2));
        Q = (Wn./(2*(abs(real(P)))));
        Wnz = sqrt(((real(Z)).^2)+(imag(Z).^2));
    else
        P = poles;
        Wn = sqrt(((real(P)).^2)+(imag(P).^2));
        Q = (Wn./(2*(abs(real(P)))))
        Q = sort(Q,'descend')
```

```
    end

%%%%%metodo para no duplicar los valores de Q
switch TIPO
    case 'low'
        Q(2:2:(n)) = [];
        Q = sort(Q,'descend');
        Wn(2:2:(n)) = [];

        if (bandera == 0)|(bandera == 1)
            Wn;
            Q;
        elseif mod(N,2)~=0%%% si n es impar
            Wn = sort(Wn,'ascend');
        else
            Wn = sort(Wn,'ascend');
        end
        %Wn = sort(Wn,'ascend');
        if (bandera == 4|bandera == 1)%%%%para el caso de chebyshev
inverso y eliptico
            if n == 3
                Wnz;
            elseif bandera == 1 %%eliptico

                Wnz3 = length(Wnz);
                if Wnz3 == n/2%%para caso par
                    Wnz(2:2:Wnz3) = [];
                    Wnz = sort(Wnz,'ascend');
                else
                    Wnz(2:2:n)=[];
                end

                if length(Z) == length(P)
                    Z(2:2:n)=[];
                else
                    Wnzdim = length(Wnz);
                    for t=1:Wnzdim
                        prueb(t)=Wnz(t);
                    end

                    valor=prueb(Wnzdim);
                    prueb(Wnzdim+1)=valor;
                    for t=1:(Wnzdim+1)
                        Wnz(t)=prueb(t);
                    end
                    Wnz(:)
                end
            else
                Wnz(2:2:n)=[];
            end
        end

    case 'high'
        Q(2:2:(n)) = [];
        Wn(2:2:(n)) = [];
        if bandera == 1
            Wn;
        else
            Wn = sort(Wn,'ascend')
        end
```

```
        if (bandera == 4|bandera == 1|bandera==0)%%%%para el caso de
chebyshev inverso
            if bandera == 1
                Wnz(2:2:n)=[];
                Wnzdim = length(Wnz);
                for t=1:Wnzdim
                    prueb(t)=Wnz(t);
                end
                valor=prueb(Wnzdim);
                prueb(Wnzdim)=[];
                prueb = sort(prueb,2,'ascend');
                prueb(Wnzdim)=valor;
                for t=1:Wnzdim
                    Wnz(t)=prueb(t);
                end
            else
                Wnz(2:2:n)=[];
            end
        end
    case ' '
%%%%para el caso de chebyshev inverso, eliptico y thomson
         if (bandera == 4|bandera ==3)%|bandera==0)
                Wn(2:2:(n*2)) = [];
                Q(2:2:(n*2)) = [];
                dimz = length(Z);
                Wnz(2:2:(dimz)) = [];
            else
                Q(2:2:(n*2)) = [];
                Wn(2:2:(n*2)) = [];
         end
end

if (bandera == 4|bandera == 1|bandera==3|bandera==0)%%%para el caso de
chebyshev inverso,elipticopBa,thomson
    Q2 = num2str(Q);
    Wn2 =num2str(Wn);
    val1 = strcat(Wn2, ' ,  ',Q2);

    Wnz2 = num2str(Wnz(:))
    val = strcat(val1, '   ,  ',Wnz2);
else
    Q2 = num2str(Q);
    Wn2 =num2str(Wn);
    val = strcat(Wn2, ' ,  ',Q2);
end

set(handles.TagListboxWn,'string',num2str(val))
posval=get(handles.TagListboxWn,'value');

set(handles.TagEditWn2,'string',num2str(Wn(posval,:)))
set(handles.TagEditQ2,'string',num2str(Q(posval,:)))

C = str2num(get(handles.TagEditC,'String'));
switch TIPO
    case 'low'
        if (bandera == 4|bandera == 1|bandera==3)
            global Ws
            R3 = str2num(get(handles.TagEditR3B,'String'));
            set(handles.text25,'enable','off')
            set(handles.text13,'enable','off')
```

```
            R5 = R3;
            R6 = R5;
            C1 = C;
            C2 = C1;
            C3 = C2;
            R2 = 1 / (Wn(posval).^2);
            R1 = Q(posval) * (sqrt(R2));
            R7 = 1 / (Wnz(posval).^2);
            Ho = abs(C3);
            %%%%%imprime los valores de salida
            set(handles.TagEditC3,'string',num2str(C3));
            set(handles.TagEditHo2,'string',num2str(Ho));
            set(handles.TagEditR5,'string',num2str(R5));
            set(handles.TagEditR6,'string',num2str(R6));
            set(handles.TagEditR7,'string',num2str(R7));
            set(handles.textR4,'enable','off');
            set(handles.text15,'enable','off');
            set(handles.TagEditHo,'enable','off');

            handles.C3 = C3;
            handles.R5 = R5;
            handles.R6 = R6;
            handles.R7 = R7;
        else
            Ho = str2num(get(handles.TagEditHo,'String'));
            set(handles.text32,'enable','off');
            set(handles.TagEditR3B,'enable','off');

            C1 = C;
            C2 = C;
            R = 1./(Wn(posval)*C);
            R1 = Q(posval)*R;
            R4 = R./Ho;
            R2 = R;
            R3 = R;
            %%%%%imprime los valores de salida
            set(handles.TagEditHo2,'enable','off');
            set(handles.text31,'enable','off');
            set(handles.text33,'enable','off');
            set(handles.text32,'enable','off');
            set(handles.text35,'enable','off');
            set(handles.text37,'enable','off');
            set(handles.text39,'enable','off');
            set(handles.text41,'enable','off');
            set(handles.TagEditHo2,'enable','off');
            set(handles.TagEditR3B,'enable','off');
            set(handles.TagEditR3,'string',num2str(R3));
            set(handles.TagEditR4,'string',num2str(R4));
            set(handles.TagEditR,'string',num2str(R));

            handles.R3 = R3;
            handles.R4 = R4;
        end
        set(handles.text1,'string',num2str('Output Low Pass'));
    case 'high'
        if (bandera == 4|bandera == 1|bandera==3|bandera==0)
            global Ws
            R3 = str2num(get(handles.TagEditR3B,'String'));
            set(handles.text25,'enable','off')
            set(handles.text13,'enable','off')
```

```
            R5 = R3;
            R6 = R5;
            C1 = C;
            C2 = C1
            C3 = C2;
            R2 = (1./Wn(posval)).^2;
            R1 = (Q(posval))*sqrt(R2);
            R7 = (1./(Wnz(posval))).^2;
            Ho = abs(C3);
            %%%%%imprime los valores de salida
            set(handles.TagEditC3,'string',num2str(C3));
            set(handles.TagEditHo2,'string',num2str(Ho));
            set(handles.TagEditR5,'string',num2str(R5));
            set(handles.TagEditR6,'string',num2str(R6));
            set(handles.TagEditR7,'string',num2str(R7));
            set(handles.textR4,'enable','off');
            set(handles.text15,'enable','off');
            set(handles.TagEditHo,'enable','off');

            handles.C3 = C3;
            handles.R3 = R3;
            handles.R5 = R5;
            handles.R6 = R6;
            handles.R7 = R7;
        else
            set(handles.text32,'enable','off');
            set(handles.TagEditHo,'enable','off');
            set(handles.TagEditR3B,'enable','off');
            set(handles.textR4,'enable','off');
            set(handles.text25,'enable','off');
            set(handles.text15,'enable','off');
            set(handles.text39,'enable','off');
            C3 = C;
            C1 = C3;
            C2 = C1;
            R3 = 1;
            R5 = R3;
            R6 = R5;
            Ho = abs(C3);
            R2 = (1/(Wn(posval))).^2;
            R1 = (Q(posval)) * (sqrt(R2));
            %%%%%imprime los valores de salida
            set(handles.TagEditR3,'string',num2str(R3));
            set(handles.TagEditR5,'string',num2str(R5));
            set(handles.TagEditR6,'string',num2str(R6));
            set(handles.TagEditC3,'string',num2str(C1));
            set(handles.TagEditHo2,'string',num2str(Ho));

            handles.R3 = R3;
            handles.R5 = R5;
            handles.R6 = R6;
            handles.C3 = C3;
        end
        set(handles.text1,'string',num2str('Output High Pass'));
    case ' '
        if (bandera == 4|bandera == 1|bandera==3|bandera==0)
            global Ws
            R3 = str2num(get(handles.TagEditR3B,'String'));
            set(handles.text25,'enable','off')
            set(handles.text13,'enable','off')
```

```
            R5 = R3;
            R6 = R5;
            C1 = C;
            C2 = C1;
            C3 = C2;
            R2 = (1./Wn(posval)).^2;
            R1 = (Q(posval))*sqrt(R2);
            R7 = (1./(Wnz(posval))).^2;
            Ho = abs(C3);
            %%%%%imprime los valores de salida
            set(handles.TagEditC3,'string',num2str(C3));
            set(handles.TagEditHo2,'string',num2str(Ho));
            set(handles.TagEditR5,'string',num2str(R5));
            set(handles.TagEditR6,'string',num2str(R6));
            set(handles.TagEditR7,'string',num2str(R7));
            set(handles.textR4,'enable','off');
            set(handles.text15,'enable','off');
            set(handles.TagEditHo,'enable','off');

            handles.C3 = C3;
            handles.R3 = R3;
            handles.R5 = R5;
            handles.R6 = R6;
            handles.R7 = R7;
        else
            Ho = str2num(get(handles.TagEditHo,'String'));
            set(handles.text32,'enable','off');
            set(handles.TagEditR3B,'enable','off');

            C1 = C;
            C2 = C;
            R = 1./(Wn(posval)*C);
            R1 = Q(posval)*R;
            R4 = R1./Ho;
            R2 = R;
            R3 = R;
            %%%%%imprime los valores de salida
            set(handles.TagEditHo2,'enable','off');
            set(handles.text31,'enable','off');
            set(handles.text33,'enable','off');
            set(handles.text32,'enable','off');
            set(handles.text35,'enable','off');
            set(handles.text37,'enable','off');
            set(handles.text39,'enable','off');
            set(handles.text41,'enable','off');
            set(handles.TagEditHo2,'enable','off');
            set(handles.TagEditR3B,'enable','off');
            set(handles.TagEditR3,'string',num2str(R3));
            set(handles.TagEditR4,'string',num2str(R4));
            set(handles.TagEditR,'string',num2str(R));

            handles.R3 = R3;
            handles.R4 = R4;
        end
        set(handles.text1,'string',num2str('Output Band Pass'));
end
%%%%%imprime los valores de salida
        set(handles.TagEditC1,'string',num2str(C1));
        set(handles.TagEditC2,'string',num2str(C2));
        set(handles.TagEditR1,'string',num2str(R1));
        set(handles.TagEditR2,'string',num2str(R2));
```

```
        handles.C1 = C1;
        handles.C2 = C2;
        handles.R1 = R1;
        handles.R2 = R2;

%%%%%selecciona el tipo de circuito
switch TIPO
    case 'low'
        if (bandera == 4|bandera == 1|bandera==3)
            T = ['towthomasBi.jpg'];
        else
            T = ['towthomas.jpg'];
        end
    case 'high'
        if (bandera == 4|bandera == 1|bandera==3|bandera==0)
            T = ['towthomasBi.jpg'];
        else
            T = ['towthomaspa.jpg'];
        end
    case ' '
        if (bandera == 4|bandera == 1|bandera==3|bandera==0)
            T = ['towthomasBi.jpg'];
        else
            T = ['towthomas.jpg'];
        end
end

[X,MAP] = IMREAD(T,'jpg');
subplot(handles.axes1)
image(X)
colormap(MAP)
axis off
axis equal
clc

function TagListboxWn_Callback(hObject, eventdata, handles)

global Q
global Wn
global N
global Wc
global TIPO
global bandera
global Ws
global handles

s=get(handles.TagListboxWn,'value');

C = str2num(get(handles.TagEditC,'String'));

switch TIPO
    case 'low'
        if (bandera == 4|bandera == 1|bandera==3)
            global Wnz
            Wnz;
            R3 = str2num(get(handles.TagEditR3B,'String'));
            set(handles.text25,'enable','off')
            set(handles.text13,'enable','off')
```

```
            R5 = R3;
            R6 = R5;
            C1 = C;
            C2 = C1;
            C3 = C2;
            R2 = (1/Wn(s)).^2;
            R1 = (Q(s))*sqrt(R2);
            R7 = (1/(Wnz(s))).^2;
            Ho = abs(C3);
            %%%%%imprime los valores de salida
            set(handles.TagEditC3,'string',num2str(C3));
            set(handles.TagEditHo2,'string',num2str(Ho));
            set(handles.TagEditR5,'string',num2str(R5));
            set(handles.TagEditR6,'string',num2str(R6));
            set(handles.TagEditR7,'string',num2str(R7));
            set(handles.textR4,'enable','off');
            set(handles.text15,'enable','off');
            set(handles.TagEditHo,'enable','off');
            R3
            handles.R3(s) = R3;
            handles.R5(s) = R5;
            handles.R6(s) = R6;
            handles.R7(s) = R7;
            handles.C3(s) = C3;
        else
            Ho = str2num(get(handles.TagEditHo,'String'));
            set(handles.text32,'enable','off');
            set(handles.TagEditR3B,'enable','off');

            C1 = C;
            C2 = C;
            R = 1./(Wn(s)*C);
            R1 = Q(s)*R;

            switch TIPO
                case 'low'
                    R4 = R./Ho;
                case 'high'
                    R4 = R./Ho;
                case ' '
                    R4 = R1./Ho;
            end

            R2 = R;
            R3 = R;
            %%%%%imprime los valores de salida
            set(handles.TagEditHo2,'enable','off');
            set(handles.text33,'enable','off');
            set(handles.text32,'enable','off');
            set(handles.text35,'enable','off');
            set(handles.text37,'enable','off');
            set(handles.text39,'enable','off');
            set(handles.TagEditR3B,'enable','off');
            set(handles.TagEditR3,'string',num2str(R3));
            set(handles.TagEditR4,'string',num2str(R4));
            set(handles.TagEditR,'string',num2str(R));

            handles.R3(s) = R3;
            handles.R4(s) = R4;
        end
    case 'high'
```

```
    if (bandera == 4|bandera == 1|bandera==3|bandera==0)
        global Wnz
        Wnz;
        R3 = str2num(get(handles.TagEditR3B,'String'));
        set(handles.text25,'enable','off')
        set(handles.text13,'enable','off')

        R5 = R3;
        R6 = R5;
        C1 = C;
        C2 = C1;
        C3 = C2;
        R2 = (1/Wn(s)).^2;
        R1 = (Q(s))*sqrt(R2);
        R7 = (1/(Wnz(s))).^2;
        Ho = abs(C3);
        %%%%%imprime los valores de salida
        set(handles.TagEditC3,'string',num2str(C3));
        set(handles.TagEditHo2,'string',num2str(Ho));
        set(handles.TagEditR5,'string',num2str(R5));
        set(handles.TagEditR6,'string',num2str(R6));
        set(handles.TagEditR7,'string',num2str(R7));
        set(handles.textR4,'enable','off');
        set(handles.text15,'enable','off');
        set(handles.TagEditHo,'enable','off');
        handles.R3(s) = R3;
        handles.C3(s) = R3;
        handles.R5(s) = R5;
        handles.R6(s) = R6;
        handles.R7(s) = R7;
    else
        set(handles.text32,'enable','off');
        set(handles.TagEditHo,'enable','off');
        set(handles.TagEditR3B,'enable','off');
        set(handles.textR4,'enable','off');
        set(handles.text25,'enable','off');
        set(handles.text15,'enable','off');
        set(handles.text39,'enable','off');
        C3 = C;
        C1 = C3;
        C2 = C1;
        R3 = 1;
        R5 = R3;
        R6 = R5;
        Ho = abs(C3);
        R2 = (1/(Wn(s))).^2;
        R1 = (Q(s)) * (sqrt(R2));
        %%%%%imprime los valores de salida
        set(handles.TagEditR3,'string',num2str(R3));
        set(handles.TagEditR5,'string',num2str(R5));
        set(handles.TagEditR6,'string',num2str(R6));
        set(handles.TagEditC3,'string',num2str(C1));
        set(handles.TagEditHo2,'string',num2str(Ho));

        handles.R3(s) = R3;
        handles.R5(s) = R5;
        handles.R6(s) = R6;
        handles.C3(s) = C3;
    end
    set(handles.text1,'string',num2str('Output High Pass'));
case ' '
```

```
if (bandera == 4|bandera == 1|bandera==3|bandera==0)
    %global Ws
    global Wnz
    Wnz
    R3 = str2num(get(handles.TagEditR3B,'String'));
    set(handles.text25,'enable','off')
    set(handles.text13,'enable','off')

    R5 = R3;
    R6 = R5;
    C1 = C;
    C2 = C1;
    C3 = C2;
    R2 = (1/Wn(s)).^2;
    R1 = (Q(s))*sqrt(R2);
    R7 = (1/(Wnz(s))).^2;
    Ho = abs(C3);
            %%%%%imprime los valores de salida
    set(handles.TagEditC3,'string',num2str(C3));
    set(handles.TagEditHo2,'string',num2str(Ho));
    set(handles.TagEditR5,'string',num2str(R5));
    set(handles.TagEditR6,'string',num2str(R6));
    set(handles.TagEditR7,'string',num2str(R7));
    set(handles.textR4,'enable','off');
    set(handles.text15,'enable','off');
    set(handles.TagEditHo,'enable','off');

    handles.R3(s) = R3;
    handles.C3(s) = R3;
    handles.R5(s) = R5;
    handles.R6(s) = R6;
    handles.R7(s) = R7;
else
    Ho = str2num(get(handles.TagEditHo,'String'));
    set(handles.text32,'enable','off');
    set(handles.TagEditR3B,'enable','off');

    C1 = C;
    C2 = C;
    R = 1./(Wn(s)*C);
    R1 = Q(s)*R;
switch TIPO
    case 'low'
        R4 = R./Ho;
    case 'high'
        R4 = R./Ho;
    case ' '
        R4 = R1./Ho;
end
R2 = R;
R3 = R;
        %%%%%imprime los valores de salida
    set(handles.TagEditHo2,'enable','off');
    set(handles.text33,'enable','off');
    set(handles.text32,'enable','off');
    set(handles.text35,'enable','off');
    set(handles.text37,'enable','off');
    set(handles.text39,'enable','off');
    set(handles.TagEditR3B,'enable','off');
    set(handles.TagEditR3,'string',num2str(R3));
    set(handles.TagEditR4,'string',num2str(R4));
```

```
            set(handles.TagEditR,'string',num2str(R));

            handles.R3(s) = R3;
            handles.R4(s) = R4;
        end
end
%%%%%imprime los valores de salida
set(handles.TagEditC1,'string',num2str(C1));
set(handles.TagEditC2,'string',num2str(C2));
set(handles.TagEditR1,'string',num2str(R1));
set(handles.TagEditR2,'string',num2str(R2));

handles.C1(s) = C1;
handles.C2(s) = C2;
handles.R1(s) = R1;
handles.R2(s) = R2;


if mod(N,2)~=0
    if Q(s)<=.5
        set(handles.TagEditC1,'enable','off')
        set(handles.TagEditC2,'enable','off')
        set(handles.TagEditR,'enable','off')
        set(handles.TagEditR1,'enable','off')
        set(handles.TagEditR2,'enable','off')
        set(handles.TagEditR3,'enable','off')
        set(handles.TagEditR4,'enable','off')
        warningpb(Wc)

    else
        set(handles.TagEditC1,'enable','on')
        set(handles.TagEditC2,'enable','on')
        set(handles.TagEditR,'enable','on')
        set(handles.TagEditR1,'enable','on')
        set(handles.TagEditR2,'enable','on')
        set(handles.TagEditR3,'enable','on')
        set(handles.TagEditR4,'enable','on')


    end
end

set(handles.TagEditWn2,'string',num2str(Wn(s,:)))
set(handles.TagEditQ2,'string',num2str(Q(s,:)))
clc
function TagPushBack_Callback(hObject, eventdata, handles)
global bandera
global TIPO
close;
if bandera == 4 %%%%chen inverso
    actinvcheb(TIPO,2,3,4);
elseif (bandera == 1|bandera == 3) %%%eliptico
    activeEpb(TIPO,2,3,4,5,6);
elseif bandera == 0 %%%Thomson
    activeTT(TIPO,2,3,4,5,6);
else
    active(1,2,3,4);
end
clear global handles
clc
```

```
function pushbutton4_Callback(hObject, eventdata, handles)
global TIPO
global N
global handles
global bandera
global C
global R

s = get(handles.TagListboxWn,'value');
        delete respuesta.cir
        diary respuesta.cir
        fprintf('\n')
        fprintf('.lib "nom.lib"\n')
        fprintf('.AC DEC 100 .01 10\n')
        fprintf('.PROBE V(*) I(*) W(*) D(*) NOISE(*)\n')
        fprintf('v1 11 0 DC 0Vdc AC 1Vac \n')

switch TIPO
    case 'low'
        if (bandera == 4|bandera == 1|bandera==3)
            for j = 1:(N/2)
                R1(s) = handles.R1(j);
                R2(s) = handles.R2(j);
                R3(s) = handles.R3(j);
                R5(s) = handles.R5(j);
                R6(s) = handles.R6(j);
                R7(s) = handles.R7(j);
                C1(s) = handles.C1(j);
                C2(s) = handles.C2(j);
                C3(s) = handles.C3(j);
                if j == 1
                    fprintf('R7%d 1%d 2%d %f\n',j,j,j,R7(s))
                    fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
                    fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
                    fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                    fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('C3%d 1%d 6%d %f\n',j,j,j,C3(s))
                    if mod(N,2)~=0
                        fprintf('R%d 7%d 8%d %f\n',j,j,j,R)
                        fprintf('C%d 8%d 0 %f\n',j,j,C)
                    end
                else
                    fprintf('R7%d 7%d 2%d %f\n',j,j-1,j,R7(s))
                    fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
                    fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
                    fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                    fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('C3%d 7%d 6%d %f\n',j,j-1,j,C3(s))
                    if mod(N,2)~=0
```

```
                    fprintf('R%d 7%d 8%d %f\n',j,j,j,R)
                    fprintf('C%d 8%d 0 %f\n',j,j,C)
                end
            end
        end
    else
        for j = 1:(N/2)
            R1(s) = handles.R1(j);
            R2(s) = handles.R2(j);
            R3(s) = handles.R3(j);
            R4(s) = handles.R4(j);
            C1(s) = handles.C1(j);
            C2(s) = handles.C2(j);
                if j == 1
                    fprintf('R4%d 1%d 2%d %f\n',j,j,j,R4(s))
                    fprintf('R1%d 2%d 3%d %f\n',j,j,j,R1(s))
                    fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R2%d 3%d 4%d %f\n',j,j,j,R2(s))
                    fprintf('C2%d 4%d 5%d %f\n',j,j,j,C2(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('Ra%d 5%d 6%d %f\n',j,j,j,R2(s))
                    fprintf('Rb%d 6%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    fprintf('R3%d 2%d 7%d %f\n',j,j,j,R3(s))
                    if mod(N,2)~=0
                        fprintf('R7%d 7%d 8%d %f\n',j,j,j,R)
                        fprintf('C4%d 8%d 0 %f\n',j,j,C)
                    end
                else
                    fprintf('R4%d 7%d 2%d %f\n',j,j-1,j,R4(s))
                    fprintf('R1%d 2%d 3%d %f\n',j,j,j,R1(s))
                    fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R2%d 3%d 4%d %f\n',j,j,j,R2(s))
                    fprintf('C2%d 4%d 5%d %f\n',j,j,j,C2(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('Ra%d 5%d 6%d %f\n',j,j,j,R2(s))
                    fprintf('Rb%d 6%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    fprintf('R3%d 2%d 7%d %f\n',j,j,j,R3(s))
                    if mod(N,2)~=0
                        fprintf('R7%d 7%d 8%d %f\n',j,j,j,R)
                        fprintf('C4%d 8%d 0 %f\n',j,j,C)
                    end
                end
        end
    end
case 'high'
    if (bandera == 4|bandera == 1|bandera==3)
        for j = 1:(N/2)
            R1(s) = handles.R1(j);
            R2(s) = handles.R2(j);
            R3(s) = handles.R3(j);
            R5(s) = handles.R5(j);
            R6(s) = handles.R6(j);
            R7(s) = handles.R7(j);
            C1(s) = handles.C1(j);
            C2(s) = handles.C2(j);
            C3(s) = handles.C3(j);
            if j == 1
```

```
            fprintf('R7%d 1%d 2%d %f\n',j,j,j,R7(s))
            fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
            fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
            fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
            fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
            fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
            fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
            fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
            fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
            fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
            fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
            fprintf('C3%d 1%d 6%d %f\n',j,j,j,C3(s))
            if mod(N,2)~=0
                fprintf('R%d 8%d 0 %f\n',j,j,j,R)
                fprintf('C%d 7%d 8%d %f\n',j,j,C)
            end
        else
            fprintf('R7%d 7%d 2%d %f\n',j,j-1,j,R7(s))
            fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
            fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
            fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
            fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
            fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
            fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
            fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
            fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
            fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
            fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
            fprintf('C3%d 7%d 6%d %f\n',j,j-1,j,C3(s))
            if mod(N,2)~=0
                fprintf('R%d 8%d 0 %f\n',j,j,j,R)
                fprintf('C%d 7%d 8%d %f\n',j,j,C)
            end
        end
    end
else
    for j = 1:(N/2)
        R1(s) = handles.R1(j);
        R2(s) = handles.R2(j);
        R3(s) = handles.R3(j);
        C1(s) = handles.C1(j);
        C3(s) = handles.C3(j);
            if j == 1
                fprintf('C3%d 1%d 6%d %f\n',j,j,j,C3(s))
                fprintf('C2%d 2%d 3%d %f\n',j,j,j,C1(s))
                fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                fprintf('R5%d 3%d 4%d %f\n',j,j,j,R3(s))
                fprintf('R6%d 4%d 5%d %f\n',j,j,j,R3(s))
                fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                fprintf('R3%d 5%d 6%d %f\n',j,j,j,R3(s))
                fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                fprintf('C1%d 6%d 7%d %f\n',j,j,j,C1(s))
                fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                if mod(N,2)~=0
                    fprintf('C%d 7%d 8%d %f\n',j,j,j,C)
                    fprintf('R%d 8%d 0 %f\n',j,j,R)
                end
            else
                fprintf('C3%d 7%d 6%d %f\n',j,j-1,j,C3(s))
                fprintf('C2%d 2%d 3%d %f\n',j,j,j,C1(s))
```

```
                    fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R5%d 3%d 4%d %f\n',j,j,j,R3(s))
                    fprintf('R6%d 4%d 5%d %f\n',j,j,j,R3(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('R3%d 5%d 6%d %f\n',j,j,j,R3(s))
                    fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                    fprintf('C1%d 6%d 7%d %f\n',j,j,j,C1(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    if mod(N,2)~=0
                        fprintf('C%d 7%d 8%d %f\n',j,j,j,C)
                        fprintf('R%d 8%d 0 %f\n',j,j,R)
                    end
                end
            end
        end
case ' '
    if (bandera == 4|bandera == 1|bandera==3)%|bandera==0)
        for j = 1:N
            R1(s) = handles.R1(j);
            R2(s) = handles.R2(j);
            R3(s) = handles.R3(j);
            R5(s) = handles.R5(j);
            R6(s) = handles.R6(j);
            R7(s) = handles.R7(j);
            C1(s) = handles.C1(j);
            C2(s) = handles.C2(j);
            C3(s) = handles.C3(j);
            if j == 1
                fprintf('R7%d 1%d 2%d %f\n',j,j,j,R7(s))
                fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
                fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
                fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
                fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
                fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                fprintf('C3%d 1%d 6%d %f\n',j,j,j,C3(s))
            else
                fprintf('R7%d 7%d 2%d %f\n',j,j-1,j,R7(s))
                fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                fprintf('R3%d 3%d 4%d %f\n',j,j,j,R3(s))
                fprintf('R5%d 4%d 5%d %f\n',j,j,j,R5(s))
                fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                fprintf('R6%d 5%d 6%d %f\n',j,j,j,R6(s))
                fprintf('R1%d 6%d 7%d %f\n',j,j,j,R1(s))
                fprintf('C2%d 6%d 7%d %f\n',j,j,j,C2(s))
                fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                fprintf('R2%d 2%d 7%d %f\n',j,j,j,R2(s))
                fprintf('C3%d 7%d 6%d %f\n',j,j-1,j,C3(s))
            end
        end
    else
        for j = 1:N
            R1(s) = handles.R1(j);
            R2(s) = handles.R2(j);
            R3(s) = handles.R3(j);
```

```
                R4(s) = handles.R4(j);
                C1(s) = handles.C1(j);
                C2(s) = handles.C2(j);

                if j == 1
                    fprintf('R4%d 1%d 2%d %f\n',j,j,j,R4(s))
                    fprintf('R1%d 2%d 3%d %f\n',j,j,j,R1(s))
                    fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                    fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                    fprintf('R2%d 3%d 4%d %f\n',j,j,j,R2(s))
                    fprintf('C2%d 4%d 5%d %f\n',j,j,j,C2(s))
                    fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                    fprintf('Ra%d 5%d 6%d %f\n',j,j,j,R2(s))
                    fprintf('Rb%d 6%d 7%d %f\n',j,j,j,R2(s))
                    fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                    fprintf('R3%d 2%d 7%d %f\n',j,j,j,R3(s))
                else
                     fprintf('R4%d 3%d 2%d %f\n',j,j-1,j,R4(s))
                     fprintf('R1%d 2%d 3%d %f\n',j,j,j,R1(s))
                     fprintf('C1%d 2%d 3%d %f\n',j,j,j,C1(s))
                     fprintf('E1%d 3%d 0 0 2%d 1meg\n',j,j,j)
                     fprintf('R2%d 3%d 4%d %f\n',j,j,j,R2(s))
                     fprintf('C2%d 4%d 5%d %f\n',j,j,j,C2(s))
                     fprintf('E2%d 5%d 0 0 4%d 1meg\n',j,j,j)
                     fprintf('Ra%d 5%d 6%d %f\n',j,j,j,R2(s))
                     fprintf('Rb%d 6%d 7%d %f\n',j,j,j,R2(s))
                     fprintf('E3%d 7%d 0 0 6%d 1meg\n',j,j,j)
                     fprintf('R3%d 2%d 7%d %f\n',j,j,j,R3(s))
                end
            end
        end
end

if TIPO == ' '
    j = N;
    if (bandera == 4|bandera == 1|bandera==3)%|bandera==0)
        fprintf('.print AC V(7%d)\n',j)
    else
        fprintf('.print AC V(3%d)\n',j)
    end
else
    if mod(N,2)~=0
        j = int8((N/2)-1);
        fprintf('.print AC V(8%d)\n',j)
    else
        j = N/2;
        fprintf('.print AC V(7%d)\n',j)
    end
end

fprintf('.end')
diary off

!C:/Orcad/PSpice/pspice.exe run C:/elip3/respuesta.cir

function pushbutton5_Callback(hObject, eventdata, handles)
global Ws
global TIPO
global handles
global Wc
```

```
global N
global Q
global bandera

if bandera == 0 %%%thomson
    Ws = Wc;
end
v = get(handles.TagListboxWn,'value');

switch TIPO
    case 'low'
        if (bandera == 4|bandera == 1|bandera==3)
            R1 = handles.R1(v);
            R2 = handles.R2(v);
            R7 = handles.R7(v);

            z = 1/R7;
            p1 = 1/R1;
            p = 1/R2;

            num = [1 0 z];
            den = [1 p1 p];
            if mod(N,2)~=0
                if Q(v)<=.5
                    global C
                    C;
                    R = 1/(Wc*C);
                    p1 = R;
                    p = 1;

                    num = [0 1];
                    den = [p1 p];
                end
            end
        else
            R1 = handles.R1(v);
            R2 = handles.R2(v);
            R3 = handles.R3(v);
            R4 = handles.R4(v);
            C1 = handles.C1(v);
            C2 = handles.C2(v);

            z = -(1/(R2*R4*C1*C2));
            p1 = 1/(R1*C1);
            p = 1/(R2*R3*C1*C2);

            num = [0 z];
            den = [1 p1 p];
            if mod(N,2)~=0
                if Q(v)<=.5
                    global C
                    C;
                    R = 1/(Wc*C);
                    p1 = R;
                    p = 1;

                    num = [0 1];
                    den = [p1 p];
                end
            end
```

```
    end
case 'high'
    if (bandera == 4|bandera == 1|bandera==3)
        R1 = handles.R1(v);
        R2 = handles.R2(v);
        R7 = handles.R7(v);

        z = 1/R7;
        p1 = 1/R1;
        p = 1/R2;

        num = [1 0 z];
        den = [1 p1 p];
        if mod(N,2)~=0
            if Q(v)<=.5
                global C
                C;
                R = 1/(Wc*C);
                p1 = R;
                p = 1;

                num = [0 1];
                den = [p1 p];
            end
        end
    else
        R1 = handles.R1(v);
        R2 = handles.R2(v);
        C3 = handles.C3(v);

        z = -C3;
        p1 = 1/R1;
        p = 1/R2;

        num = [z 0 0];
        den = [1 p1 p];
        if mod(N,2)~=0
             if Q(v)<=.5
                 global C
                 C;
                 R = 1/(Wc*C);
                 p1 = R;
                 p = 1;

                 num = [1 0];
                 den = [p1 p];
             end
        end
    end
case ' '
    if (bandera == 4|bandera == 1|bandera==3|bandera==0)
        R1 = handles.R1(v);
        R2 = handles.R2(v);
        R7 = handles.R7(v);

        z = 1/R7;
        p1 = 1/R1;
        p = 1/R2;

        num = [1 0 z];
```

```
            den = [1 p1 p];
        else
            R1 = handles.R1(v);
            R2 = handles.R2(v);
            R3 = handles.R3(v);
            R4 = handles.R4(v);
            C1 = handles.C1(v);
            C2 = handles.C2(v);

            z = -(1/(R4*C1));
            p1 = 1/(R1*C1);
            p = 1/(R3*R2*C1*C2);

            num = [z 0];
            den = [1 p1 p];
        end
end

transfer(num,den,Ws,TIPO,v,Q,N);
clc
```