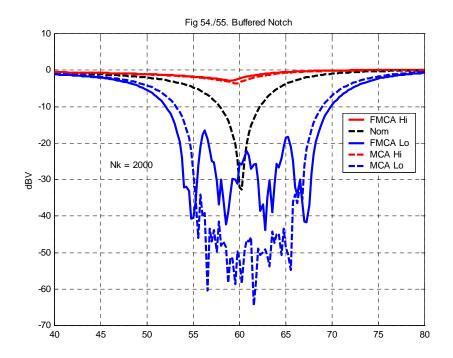
## Buffered 60-Hz Notch Filter (p.109 of TAECUM)



```
% FMCA and MCA of buffered
% 60Hz notch filter
% File: c:\M_files\bookupdate\buff60.m
% updated 11/10/06
clc;clear;tic;
K=1e3;n=1e-9;
R1=19*K;R2=57.6*K;R3=464*K;R4=200;
R5=4.8*K;C1=46*n;C2=C1;C3=C1;
Nom=[R1 R2 R3 R4 R5 C1 C2 C3];
Nc=size(Nom,2);
BF=40; LF=80; NP=161;
F=linspace(BF,LF,NP);
Tr=0.01;Tc=0.1;
T=[-Tr -Tr -Tr -Tr -Tc -Tc -Tc;
   Tr Tr Tr Tr Tc Tc Tc];
% G5
% * * * * *
              * * * * * * * Begin Template * * * *
% FMCA Setup
Nc=size(T,2);Nf=2^Nc;
Tf=zeros(Nf,Nc);
k=1:Nf;RB=dec2bin(k-1);
for k=1:Nf
   for w=1:Nc;
      if RB(k,w)=='0'
         Tf(w,k)=Nom(w)*(1+T(1,w));
         Tf(w,k)=Nom(w)*(1+T(2,w));
      {\tt end}
   end
end
% MCA Setup
rand('state',sum(100*clock));
```

```
for k=1:Nk;
  for w=1:Nc
     Tn(w,k)=Nom(w)*((T(2,w)-T(1,w))*rand+T(1,w)+1);
  end
end
% FMCA and MCA
for i=1:NP
  s=2*pi*F(i)*j;Vo(i)=G5(Nom,s); % Call circuit function
% FMCA
     Vf(k,i)=G5(Tf(:,k),s); % Call circuit function
  end
% MCA
  for k=1:Nk
     Vm(k,i)=G5(Tn(:,k),s); % Call circuit function
  end
end
Vmax2=max(Vf);Vmin2=min(Vf);Vmax1=max(Vm);Vmin1=min(Vm);
%
h=plot(F,Vmax2,'r',F,Vo,'k--',F,Vmin2,'b');
set(h,'LineWidth',2);grid on
h=plot(F,Vmax1,'r--',F,Vmin1,'b--');
set(h,'LineWidth',2);grid on
hold off
set(gca,'FontSize',8);
axis ([BF LF -70 10])
ylabel('dBV')
title('Fig 54./55. Buffered Notch')
text(46,-26,['Nk = ',num2str(Nk)],'FontSize',8);
legend('FMCA Hi','Nom','FMCA Lo','MCA Hi','MCA Lo',0);
figure(1)
ET=toc
function y = G5(X,s)
% buffered 60Hz notch filter
% X = [R1 R2 R3 R4 R5 C1 C2 C2];
R1=X(1);R2=X(2);R3=X(3);R4=X(4);R5=X(5);
C1=X(6);C2=X(7);C3=X(8);
A=zeros(6);
A(1,1)=1/R1+s*(C1+C2);
A(1,2)=-s*C2;A(1,5)=-1/R1;
A(2,1)=A(1,2);A(2,2)=1/R2+s*(C2+C3);
A(2,3)=-s*C3;A(2,5)=-1/R2;
A(3,2)=A(2,3);A(3,3)=1/R3+s*C3;
A(4,4)=1;A(4,5)=-1;
A(5,5)=1/R4+1/R5; A(5,6)=-1/R4;
A(6,3)=-1;A(6,6)=1;
B=[s*C1;0;1/R3;0;0;0];C=A\B;
y=20*log10(abs(C(6)));
```