LOAD FLOW ANALYSIS USING GAUSS SIEDAL ITERATIVE METHOD

```
clc
clear all
format short
basemva=100;
accuracy = 0.1;
accel = 1.6;
maxiter = 10;
epsilon=0.1;
alpha=1.6;
disp('maxiter:');
disp(maxiter);

% Bus Bus Voltage Angle ---Load---- -------Generator----- Static Mvar
%        No code Mag. Degree MW Mvar
busdata=[1 1 1.0600 0.0000 0 0
         2 0 1.0000 0.0000 0.5 0.2
         3 0 1.0000 0.0000 0.4 0.3
         4 0 1.0000 0.0000 0.3 0.1];
% Line code
% Bus bus R X 1/2 B = 1 for lines
% nl nr p.u. p.u. p.u. > 1 or < 1 tr. tap at bus nl

linedata=[1 2 0.02941 0.1176 0.0000 1
          1 3 0.05882 0.2352 0.0000 1
          2 3 0.08832 0.3532 0.0000 1
          2 4 0.05882 0.2352 0.0000 1
          3 4 0.02941 0.1176 0.0000 1 ];

j=sqrt(-1);
i = sqrt(-1);
ntr=3;
nsh=1;
error=0.01;
maxiter=10;
delmax=0;
nl = linedata(:,1);
nr = linedata(:,2);
R = linedata(:,3);
X = linedata(:,4);
Bc = j*linedata(:,5);
a = linedata(:, 6);
nbr=length(linedata(:,1));
nbus = max(max(nl), max(nr));
Z = R + j*X;
y= ones(nbr,1)./Z;
```

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```
for n = 1:nbr
if a(n) <= 0
a(n) = 1;
else
end
Ybus=zeros(nbus,nbus);
for k=1:nbr;
Ybus(nl(k),nr(k))=Ybus(nl(k),nr(k))-y(k)/a(k);
Ybus(nr(k),nl(k))=Ybus(nl(k),nr(k));
end
end

for n=1:nbus
for k=1:nbr
if nl(k)==n
Ybus(n,n) = Ybus(n,n)+y(k)/(a(k)^2) + (Bc(k)/2);
elseif nr(k)==n
Ybus(n,n) = Ybus(n,n)+y(k) +Bc(k);
else
end
end
end
disp('Ybus:');
disp(Ybus);
ang=angle(Ybus);
g=real(Ybus);
b=imag(Ybus);
r=0;
npv=0;
npq=0;
pq=0;
Pgen=0;


for k=1:nbus
n=busdata(k,1);
kb(n)=busdata(k,2);
Vm(n)=busdata(k,3);
delta(n)=busdata(k, 4);
P(n)=busdata(k,5);
Q(n)=busdata(k,6);
end
```

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```
for k=1:nbus
r=r+1;
bus(r)=busdata(k,1);
type(r)=busdata(k,2);
if(type(r)==0)
npq=npq+1;
pq(npq)=bus(r);
end
end


for i=1:nbus
Vmold(i)=Vm(i);
end


iter=0;

for iter=1: maxiter
for i = 2:nbus
s=0+0j;
for L = 1:nbr
if nl(L) == i
k=nr(L);
s = s + Ybus(i,k)*Vm(k);
elseif nr(L) == i
k=nl(L);
s = s + Ybus(i,k)*Vm(k);
end
end

if kb(i) == 1
Vm(i) = Vm(i);
elseif kb(i) == 2
Sc = conj(Vm(i))*(Ybus(i,i)*Vm(i) + s) ;
Q(i) = imag(Sc);
S(i) = P(i) + j*Q(i);
end
sum=complex(P(i),-Q(i))/conj(Vm(i));
sum=sum-s;
if kb(i) ~= 1
Vm(i)=sum/Ybus(i,i);
end
del(i)=Vm(i)-Vmold(i);
Vm(i)=Vmold(i)+alpha*del(i);
Vmold(i)=Vm(i);
end
```

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```
if abs(del(i)>=delmax);
delmax=abs(del(i));
else
end
if(delmax<=epsilon)
disp('problem has coverged ');
break;
else
end
end
disp('Voltage at bus:');
disp(Vm');
% Power flow Calucations
for i=1:nbr;
sb=linedata(i,1);
eb=linedata(i,2);
k1=linedata(i,3);
k2=linedata(i,4);
k3=linedata(i,5);
temp6=1/(complex(k1,k2));
temp7=complex(0,k3);
FLOW(sb,eb)=(conj(((temp6+temp7)*(Vm(sb)-Vm(eb)))))*(Vm(sb));
FLOW(eb,sb)=(conj((temp6+temp7)*(Vm(eb)-Vm(sb))))*(Vm(eb));
end
disp('Power Flow:');
disp(FLOW);
```

OUTPUT:

```
maxiter:
    10

Ybus:
   3.0021 -12.0043i  -2.0014 + 8.0029i  -1.0007 + 4.0014i        0
  -2.0014 + 8.0029i   3.6684 -14.6690i  -0.6663 + 2.6646i  -1.0007 + 4.0014i
  -1.0007 + 4.0014i  -0.6663 + 2.6646i   3.6684 -14.6690i  -2.0014 + 8.0029i
        0            -1.0007 + 4.0014i  -2.0014 + 8.0029i   3.0021 -12.0043i

Voltage at bus:
   1.0600
   1.1093 - 0.0712i
   1.1310 - 0.0898i
   1.1348 - 0.1040i

Power Flow:
        0            -0.7087 - 0.2675i  -0.4564 - 0.2058i        0
   0.7238 + 0.3275i        0            -0.0679 - 0.0548i  -0.1687 - 0.0877i
   0.4695 + 0.2582i   0.0684 + 0.0570i        0            -0.1362 - 0.0132i
        0             0.1704 + 0.0946i   0.1366 + 0.0149i        0
```