**Experiment 8**

**Aim:** To find parameters and performance of long transmission line using MATLAB.

Develop program in MATLAB to determine

Q1. A 50 Hz transmission line 300 km long has a total series impedance of 40 + j125 ohms and a total shunt admittance of 10–3 mho. The receiving-end load is 50 MW at 220 kV with 0.8 lagging power factor. Find a) the sending-end voltage, current, power and power factor

b) voltage regulation and efficiency

using:

1. Short line approximation,
2. Nominal-pi method,
3. Exact transmission line equation,
4. Approximation Comment on the results obtained.

Comment on the results obtained.

**Apparatus Required:** MATLAB 2020a (software used)

**MATLAB Code:**

clc

clear all

f=50;

Z=40+j\*125;

Y=j\*10^(-3);

P=50;

V=input('enter the phase voltage:');

Vr=V/sqrt(3)+0\*j;

l=300\*(10)^3;

pf=0.8;

sr=P+i\*P\*tan(acos(pf));%for ir angle

ir=conj(sr)/(3\*conj(Vr))

n=input('method to be used : 1.short line 2.pi 3.exact 4.appro');

switch n

case 1.

A=1;B=Z;C=0;D=A;

case 2.

A=1+(Y\*Z)/2;B=Z;C=Y\*(1+(Y\*Z)/4);D=A;

case 3.

Zc=sqrt(Z/Y);

gamma=sqrt(Z\*Y);

A=cosh(gamma);

B=(Zc)\*sinh(gamma);

C=(1/Zc)\*sinh(gamma);

D=cosh(gamma);

case 4.

A=(1+(Y\*Z)/2);

B=Z\*(1+(Y\*Z)/6);

C=Y\*(1+(Y\*Z)/6);

D=A;

end

ABCD\_1=[A B;C D];

p=ABCD\_1\*[Vr;ir];

Vs=p(1)

is=p(2)

sendingpf=angle(Vs)-angle(is);

pf=cos(sendingpf);

vnoload=(Vs/A);

VR=(((vnoload)-Vr)/Vr)\*100

pss=3\*Vs\*conj(is)

efficiency=100\*(P/real(pss))

**Output:**

1. Short line method

vs = 1.4457e+02 + 1.2466e+01i

is = 0.1312 - 0.0984i

pf = 0.7455

pss = 53.2283 +47.5885i

VR = 13.8171 + 9.8140i

ps = 0.9393

1. Pi method

vs = 1.3663e+02 + 1.5006e+01i

is = 0.1237 + 0.0334i

pf = 0.9881

pss = 52.2123 - 8.1254i

VR = 14.9548 +10.1493i

ps = 0.9576

1. Exact method

vs = 1.2550e+02 + 3.3331e+00i

is = 0.1086 - 0.0952i

pf = 0.7342

pss = 39.9280 +36.9241i

VR = -1.3711 + 2.7427i

ps = 1.2523

1. Approx method

vs = 1.3618e+02 + 1.4863e+01i

is = 0.1241 + 0.0347i

pf = 0.9866

pss = 52.2634 - 8.6550i

VR = 14.5756 +10.0375i

ps = 0.9567

**Conclusion:**