Exp - 01

Transmission line Parameters Symmetrical and Unsymmetrical

Aim:

To find the Inductance and Capacitance of the phase symmetrical and unsymmetrical system

Apparatus Required:

SI.No	Apparatus	Specification
1	PC	Dual core, RAM 512 MB 1.2 GHz speed, 80 GB
2	MATLAB	7.5

Formula:

Diameter of the conductor = d

Radius of the conductor R=d/2 , R_m=0.7788×R;

Equivalent Inductance = $L = 2 \times 10^{-4} \ln\left(D/R_m\right)$

Equivalent Capacitance = $C = 2\Pi\varepsilon \ln\left(D/R\right)$

Equivalent Diameter $D = \sqrt[3]{D_{ab} D_{bc} D_{ca}}$

Theory:

An AC transmission line has resistance, inductance and capacitance uniformly distributed along its length. These are known as constants or parameters of the line .The performance of a transmission line depend to a considerable extent upon these constants. For instance, these constants determine whether the efficiency and voltage regulation of the line will be good or poor. Therefore, a sound concept of these constant is necessary in order to make the electrical design of a transmission line a technical success. Constants of transmission line are resistance, inductance and capacitance uniformly distributed along the whole length of the line.

Algorithm:

Step 1: Start the program

Step 2: Get the diameter of the conductor (d) and calculate GMR radius

$R_m = 0.7788 \times R$

Step 3: Select the case of transmission line structure Δ get distance between conductor D

Step 4:For unsymmetrical case get the 3 different distance between conductor a & b, b & c, c & a

(i.e) $D_{ab}\, D_{bc}\, D_{ca} = D = ? \sqrt{? ?? + ? ?? + ? ??}$

Step 5: Calculate Inductance and capacitance using formula

$L= 2 \times 10^{-4} \ln ?^{?} ?_{?} ?$

$C= 2?? \log ?^{?} ?_{?} ?$

Step 6: Calculate Inductive and Capacitive reactance

Step 7: Display the result

Step 8: Stop the program

Program:

```
clc;
clear all;
d=input('Enter the diameter');
R=d/2;
Rm=0.7788*R;
c=input('Enter case number');
if c==1
D=input('Enter distance');
else
Dab=input('Enter distance between a,b');
Dbc=input('Enter distance between b,c');
Dca=input('Enter distance between c,a');
D=(Dab*Dbc*Dca)^(1/3);
end
L=2e-4*log(D/Rm);
C=2*pi*8.854e-9/log(D/R);
XL=2*pi*50*L;
XC=1/(2*pi*50*C);
fprintf('Inductive Reactance %d\n',XL);
fprintf('Capacitive Reactance %d\n',XC);
```

Result: