Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design

Generation Category (1): Design

Load Diversity Factor: None

	Swing	V-Control	Load	Total
Number of Buses:	1	0	3	4

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	1	0	0	2	0	0	3

Method of Solution:	Adaptive Newton-Raphson Method
Maximum No. of Iteration:	99
Precision of Solution:	0.0001000
System Frequency:	50.00 Hz
Unit System:	Metric
Project Filename:	lab_3
Output Filename:	C:\ETAP 1901\lab_3\Untitled.lfr

Adjustments

Tolerance	Apply Adjustments	Individual /Global	Percent
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		

Temperature Correction	Apply Adjustments	Individual /Global	Degree C
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

Bus Input Data

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus#1	12.470	1	100.0	0.0								
Bus#2	12.470	1	100.0	0.0								
Bus#3	4.160	1	100.0	0.0								
Bus#4	4.160	1	100.0	0.0	1.800	0.785						
Total Number of Buses: 4					1.800	0.785	0.000	0.000	0.000	0.000	0.000	0.000

Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
Bus#1	12.470	Swing	1	100.0	0.0					
						0.000	0.000			

Line/Cable/Busway Input Data

Line/Cable/Busway							ohms or siemens/1000 m per Conductor (Cable) or per Phase (Line/Busway)		
			Length						
ID	Library	Size	Adj. (m)	% Tol.	#/Phase	T (°C)	R	X	Y
Line3		336	609.6	0.0	1	75	0.208126	0.324857	0.0000036
Line6		336	609.6	0.0	1	75	0.208126	0.324857	0.0000036

Line / Cable / Busway resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T3	3-Phase	10.000	12.470	4.160	6.50	6.00	0	0	0	0	0	6.5000	YNyn	0.000

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T3	2W XFMR	Bus#2	Bus#3	10.69	64.12	65.00	
Line3	Line	Bus#1	Bus#2	8.16	12.74	15.12	0.0003395
Line6	Line	Bus#3	Bus#4	73.31	114.43	135.90	0.0000378

LOAD_FLOW_REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* Bus#1	12.470	100.000	0.0	1.838	0.863	0.000	0.000	Bus#2	1.838	0.863	94.0	90.5	
Bus#2	12.470	99.740	-0.1	0.000	0.000	0.000	0.000	Bus#1	-1.835	-0.858	94.0	90.6	
								Bus#3	1.835	0.858	94.0	90.6	
Bus#3	4.160	98.998	-0.7	0.000	0.000	0.000	0.000	Bus#4	1.830	0.832	281.8	91.0	
								Bus#2	-1.830	-0.832	281.8	91.0	
Bus#4	4.160	96.693	-1.6	0.000	0.000	1.800	0.785	Bus#3	-1.800	-0.785	281.8	91.7	

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

# Indicates a bus with a load mismatch of more than 0.1 MVA

Bus Loading Summary Report

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					Percent
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Loading
Bus#1	12.470										2.031	90.5	94.0	
Bus#2	12.470										2.025	90.6	94.0	
Bus#3	4.160										2.010	91.0	281.8	
Bus#4	4.160		1.800	0.785							1.964	91.7	281.8	

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).
# Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Branch Loading Summary Report

CKT / Branch		Busway / Cable & Reactor			Transformer				
						Loading (input)		Loading (output)	
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	MVA	%	MVA	%
T3	Transformer				10.000	2.025	20.3	2.010	20.1

* Indicates a branch with operating load exceeding the branch capability.

Branch Losses Summary Report

Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Line3	1.838	0.863	-1.835	-0.858	3.4	4.9	100.0	99.7	0.26
Line6	1.830	0.832	-1.800	-0.785	30.2	47.2	99.0	96.7	2.31
T3	1.835	0.858	-1.830	-0.832	4.4	26.4	99.7	99.0	0.74
					38.0	78.5			

* This Transmission Line includes Series Capacitor.

Alert Summary Report

	% Alert Settings	
	Critical	Marginal
Loading		
Bus	100.0	95.0
Cable / Busway	100.0	95.0
Reactor	100.0	95.0
Line	100.0	95.0
Transformer	100.0	95.0
Panel	100.0	95.0
Protective Device	100.0	95.0
Generator	100.0	95.0
Inverter/Charger	100.0	95.0
Bus Voltage		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
Generator Excitation		
OverExcited (Q Max.)	100.0	95.0
UnderExcited (Q Min.)	100.0	

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus#4	Bus	Under Voltage	4.160	kV	4.022	96.7	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	1.838	0.863	2.031	90.52 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	1.838	0.863	2.031	90.52 Lagging
Total Motor Load:	1.800	0.785	1.964	91.67 Lagging
Total Static Load:	0.000	0.000	0.000	
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.038	0.079		
System Mismatch:	0.000	0.000		

Number of Iterations: 3