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	4	5

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	0	0	0	0	7	0	7

Method of Solution:	Adaptive Newton-Raphson Method
Maximum No. of Iteration:	99
Precision of Solution:	0.0001000
System Frequency:	60.00 Hz
Unit System:	English
Project Filename:	project-final
Output Filename:	E:\MIST projects\Level 3-1\Power system project\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		
Bus1	10.600	1	100.0	0.0										
Bus2	10.000	1	100.0	0.0	20.000	10.000								
Bus3	10.000	1	100.0	0.0	45.000	15.000								
Bus4	10.000	1	100.0	0.0	40.000	5.000								
Bus5	10.000	1	100.0	0.0	60.000	10.000								
Total Number of Buses: 5					165.000	40.000	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
Bus1	10.600	Swing	1	100.0	0.0					
Bus2	10.000	Mvar/PF Control	1	100.0	0.0	40.000	30.000	80.0		
						40.000	30.000			

Impedance Input Data

Impedance	Positive Sequence Impedance			
ID	R	X	Y	Unit
1-2	2	6	6	% in 10.000 kV base and 100.0 MVA base
1-3	8	24	5	% in 10.000 kV base and 100.0 MVA base
2-3	6	25	4	% in 10.000 kV base and 100.0 MVA base
2-4	6	18	4	% in 10.000 kV base and 100.0 MVA base
2-5	4	12	3	% in 10.000 kV base and 100.0 MVA base
3-4	1	3	2	% in 10.000 kV base and 100.0 MVA base
4-5	8	24	5	% in 10.000 kV base and 100.0 MVA base

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
1-2	Impedance	Bus1	Bus2	1.78	5.34	5.63	6.7416010
1-3	Impedance	Bus1	Bus3	7.12	21.36	22.52	5.6180010
2-3	Impedance	Bus3	Bus2	5.34	22.25	22.88	4.4944010
2-4	Impedance	Bus4	Bus2	5.34	16.02	16.89	4.4944010
2-5	Impedance	Bus2	Bus5	3.56	10.68	11.26	3.3708000
3-4	Impedance	Bus3	Bus4	0.89	2.67	2.81	2.2472000
4-5	Impedance	Bus4	Bus5	7.12	21.36	22.52	5.6180010

LOAD FLOW REPORT

| Bus | | Voltage | | Generation | | Load | | Load Flow | | | | | XFMR |
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* Bus1	10.600	100.000	0.0	129.612	-7.048	0.000	0.000	Bus2	87.223	-8.364	4772.6	-99.5	
								Bus3	42.389	1.316	2309.9	100.0	
Bus2	10.000	104.758	-2.8	40.000	30.000	20.000	10.000	Bus1	-85.864	5.777	4742.9	-99.8	
								Bus3	19.802	3.791	1111.2	98.2	
								Bus4	30.132	3.011	1668.9	99.5	
								Bus5	55.930	7.422	3109.5	99.1	
Bus3	10.000	102.289	-5.2	0.000	0.000	45.000	15.000	Bus1	-41.097	-2.867	2325.3	99.8	
								Bus2	-19.568	-7.103	1175.0	94.0	
								Bus4	15.666	-5.030	928.7	-95.2	
Bus4	10.000	102.254	-5.5	0.000	0.000	40.000	5.000	Bus2	-29.621	-5.763	1703.8	98.2	
								Bus3	-15.641	3.013	899.3	-98.2	
								Bus5	5.261	-2.250	323.1	-91.9	
Bus5	10.000	101.764	-6.2	0.000	0.000	60.000	10.000	Bus2	-54.760	-7.111	3132.8	99.2	
								Bus4	-5.240	-2.889	339.5	87.6	

* 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
Bus1	10.600										129.881	99.8	7074.2	
Bus2	10.000		20.000	10.000							129.390	97.3	7131.1	
Bus3	10.000		45.000	15.000							62.492	97.1	3527.3	
Bus4	10.000		40.000	5.000							45.965	98.5	2595.3	
Bus5	10.000		60.000	10.000							60.828	98.6	3451.0	

* 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 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	
1-2	87.223	-8.364	-85.864	5.777	1358.6	-2587.2	100.0	104.8	1.17
1-3	42.389	1.316	-41.097	-2.867	1291.4	-1550.4	100.0	102.3	3.50
2-3	19.802	3.791	-19.568	-7.103	234.0	-3312.5	104.8	102.3	2.47
2-4	30.132	3.011	-29.621	-5.763	511.2	-2752.4	104.8	102.3	2.50
2-5	55.930	7.422	-54.760	-7.111	1170.2	311.0	104.8	101.8	2.99
3-4	15.666	-5.030	-15.641	3.013	25.0	-2017.0	102.3	102.3	0.04
4-5	5.261	-2.250	-5.240	-2.889	21.3	-5139.1	102.3	101.8	0.49
					4611.7	-17047.7			

* 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	

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Gen2	Generator	Overload	40.000	MW	40.000	100.0	3-Phase
Gen2	Generator	Over Excited	24.790	Mvar	30.000	121.0	3-Phase
Gen6	Generator	Under Excited	0.000	Mvar	-7.048	0.0	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus2	Bus	Over Voltage	10.000	kV	10.476	104.8	3-Phase
Bus3	Bus	Over Voltage	10.000	kV	10.229	102.3	3-Phase
Bus4	Bus	Over Voltage	10.000	kV	10.225	102.3	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	129.612	-7.048	129.803	99.85 Leading
Source (Non-Swing Buses):	40.000	30.000	50.000	80.00 Lagging
Total Demand:	169.612	22.952	171.158	99.10 Lagging
Total Motor Load:	165.000	40.000	169.779	97.19 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:	4.612	-17.048		
System Mismatch:	0.000	0.000		

Number of Iterations: 4