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	1	7	9

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	3	0	0	6	0	0	9

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:	grid4
Output Filename:	C:\Users\owner's\Desktop\PSA PBL\grid4\grid4\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 ID	kV	Sub-sys	Initial Voltage % Mag.	Ang.	Constant kVA MW	Mvar	Constant Z MW	Mvar	Constant I MW	Mvar	Generic MW	Mvar
Bus_1	11.000	1	100.0	0.0								
Bus_2	11.000	1	100.0	0.0								
Bus_3	211.000	1	100.0	0.0								
Bus_4	211.000	1	100.0	0.0	26.907	29.598	5.661	6.227				
Bus_5	211.000	1	100.0	0.0	17.000	10.536	3.577	2.217				
Bus_6	211.000	1	100.0	0.0	14.400	19.200	3.030	4.040				
Bus_7	211.000	1	100.0	0.0	20.400	12.643	4.292	2.660				
Bus_8	211.000	1	100.0	0.0								
Bus_9	9.500	1	100.0	0.0	13.600	8.429	3.400	2.107				

Total Number of Buses: 9

					Constant kVA MW	Mvar	Constant Z MW	Mvar	Constant I MW	Mvar	Generic MW	Mvar
					92.307	80.405	19.960	17.251	0.000	0.000	0.000	0.000

Generation Bus ID	kV	Type	Sub-sys	Voltage % Mag.	Angle	Generation MW	Mvar	% PF	Mvar Limits Max	Min
Bus_1	11.000	Swing	1	100.0	0.0					
Bus_2	11.000	Voltage Control	1	100.0	0.0	40.000			84.678	0.000
Bus_9	9.500	Mvar/PF Control	1	100.0	0.0	85.000	-52.678	-85.0		
						125.000	-52.678			

Line/Cable/Busway Input Data

ohms or siemens/1000 ft per Conductor (Cable) or per Phase (Line/Busway)

Line/Cable/Busway ID	Library	Size	Length Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Line1		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010
Line3		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010
Line5		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010
Line7		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010
Line9		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010
Line10		477	5280.0	0.0	1	100	0.048250	0.157749	0.0000010

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
T1		3-Phase	157.000	11.000	230.000	10.00	34.10	0	0	0	0	0	10.0000	YNd	0.000
T3		3-Phase	100.000	11.000	230.000	10.00	34.10	0	0	0	0	0	10.0000	YNd	0.000
T4		3-Phase	100.300	230.000	11.000	10.00	34.10	0	0	0	0	0	10.0000	Dyn	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
T1	2W XFMR	Bus_1	Bus_3	0.19	6.37	6.37	
T3	2W XFMR	Bus_2	Bus_3	0.29	10.00	10.00	
T4	2W XFMR	Bus_8	Bus_9	0.29	9.97	9.97	
Line1	Line	Bus_3	Bus_4	0.05	0.16	0.16	0.2719868
Line3	Line	Bus_4	Bus_5	0.05	0.16	0.16	0.2719868
Line5	Line	Bus_6	Bus_3	0.05	0.16	0.16	0.2719868
Line7	Line	Bus_7	Bus_5	0.05	0.16	0.16	0.2719868
Line9	Line	Bus_8	Bus_6	0.05	0.16	0.16	0.2719868
Line10	Line	Bus_8	Bus_7	0.05	0.16	0.16	0.2719868

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	11.000	100.000	0.0	-11.468	107.376	0.000	0.000	Bus_3	-11.468	107.376	5667.8	-10.6	
* Bus_2	11.000	100.000	2.9	40.000	67.734	0.000	0.000	Bus_3	40.000	67.734	4128.7	50.8	
Bus_3	211.000	101.581	0.6	0.000	0.000	0.000	0.000	Bus_4	33.892	74.581	220.7	41.4	
								Bus_6	-5.759	86.919	234.6	-6.6	
								Bus_1	11.686	-99.952	271.1	-11.6	
								Bus_2	-39.819	-61.549	197.5	54.3	
Bus_4	211.000	101.425	0.6	0.000	0.000	32.731	36.004	Bus_3	-33.854	-74.695	221.2	41.3	
								Bus_5	1.124	38.691	104.4	2.9	
Bus_5	211.000	101.352	0.6	0.000	0.000	20.674	12.813	Bus_4	-1.115	-38.899	105.1	2.9	
								Bus_7	-19.559	26.086	88.0	-60.0	
Bus_6	211.000	101.424	0.6	0.000	0.000	17.517	23.356	Bus_3	5.801	-87.017	235.3	-6.7	
								Bus_8	-23.318	63.662	182.9	-34.4	
Bus_7	211.000	101.315	0.6	0.000	0.000	24.806	15.373	Bus_5	19.565	-26.302	88.5	-59.7	
								Bus_8	-44.371	10.929	123.4	-97.1	
Bus_8	211.000	101.320	0.7	0.000	0.000	0.000	0.000	Bus_6	23.344	-63.813	183.5	-34.4	
								Bus_7	44.382	-11.126	123.6	-97.0	
								Bus_9	-67.726	74.939	272.8	-67.1	
Bus_9	9.500	98.951	5.7	85.000	-52.678	16.929	10.492	Bus_8	68.071	-63.170	5703.6	-73.3	

* 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	11.000										107.987	10.6	5667.8	
Bus_2	11.000										78.663	50.8	4128.7	
Bus_3	211.000										167.809	27.2	452.0	
Bus_4	211.000		26.907	29.598	5.824	6.406					82.009	41.3	221.2	
Bus_5	211.000		17.000	10.536	3.674	2.277					44.052	46.9	118.9	
Bus_6	211.000		14.400	19.200	3.117	4.156					90.087	25.9	243.0	
Bus_7	211.000		20.400	12.643	4.406	2.730					51.581	86.0	139.3	
Bus_8	211.000										101.008	67.1	272.8	
Bus_9	9.500		13.600	8.429	3.329	2.063					105.903	80.3	6504.4	

* 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	%	
T1	Transformer				157.000	107.987	68.8	100.633	64.1	
T3	Transformer				100.000	78.663	78.7	73.306	73.3	
T4	Transformer				100.300	101.008	100.7	92.866	92.6	

*   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	
Line1	33.892	74.581	-33.854	-74.695	37.3	-113.8	101.6	101.4	0.16
Line10	-44.371	10.929	44.382	-11.126	11.7	-196.9	101.3	101.3	0.00
Line3	1.124	38.691	-1.115	-38.899	8.4	-207.9	101.4	101.4	0.07
Line5	-5.759	86.919	5.801	-87.017	42.2	-97.9	101.6	101.4	0.16
Line7	-19.559	26.086	19.565	-26.302	6.0	-215.6	101.4	101.3	0.04
Line9	-23.318	63.662	23.344	-63.813	25.7	-151.4	101.4	101.3	0.10
T1	-11.468	107.376	11.686	-99.952	217.7	7424.3	100.0	101.6	6.81
T3	40.000	67.734	-39.819	-61.549	181.4	6185.2	100.0	101.6	6.81
T4	-67.726	74.939	68.071	-63.170	345.1	11768.6	101.3	99.0	8.17
					875.4	24394.6			

* 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
Gen1	Generator	Over Excited	69.871	Mvar	107.376	153.7	3-Phase
Gen1	Generator	Under Power	0.000	MW	-11.468	0.0	3-Phase
Wind Farm	Wind Turbine Generator	Overload	85.000	MW	85.000	100.0	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	-11.468	107.376	107.987	10.62 Leading
Source (Non-Swing Buses):	125.000	15.056	125.903	99.28 Lagging
Total Demand:	113.532	122.432	166.970	68.00 Lagging
Total Motor Load:	92.307	80.405	122.415	75.40 Lagging
Total Static Load:	20.350	17.632	26.926	75.58 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.875	24.395		
System Mismatch:	0.000	0.000		

Number of Iterations: 4