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	2	6	9

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	5	0	0	3	0	0	8

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:	grid5
Output Filename:	C:\Users\owner's\Desktop\PSA PBL\grid5\grid5\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	11.000	1	100.0	0.0	0.272	0.169	0.068	0.042				
Bus2	129.400	1	100.0	0.0								
Bus3	129.500	1	100.0	0.0								
Bus4	129.400	1	100.0	0.0								
Bus5	10.760	1	100.0	0.0	1.360	0.843	0.325	0.202				
Bus6	10.760	1	102.2	0.0	0.068	0.042	0.016	0.010				
Bus7	129.400	1	100.0	0.0	0.007	0.004	0.002	0.001				
Bus8	10.800	1	101.9	0.0	0.586	0.343	0.115	0.071				
Bus9	0.414	1	100.0	0.0	0.041	0.025	0.008	0.005				
Total Number of Buses: 9					2.333	1.426	0.534	0.331	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	11.000	Swing	1	100.0	0.0					
Bus6	10.760	Voltage Control	1	102.2	0.0	0.000			0.000	0.000
Bus8	10.800	Voltage Control	1	101.9	0.0	0.000			37.211	0.000
						0.000	0.000			

Line/Cable/Busway Input Data

Line/Cable/Busway							ohms or siemens/1000 ft per Conductor (Cable) or per Phase (Line/Busway)		
			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Line1		477	5280.0	0.0	1	75	0.044604	0.157749	0.0000010
Line3		477	5280.0	0.0	1	75	0.044604	0.157749	0.0000010
Line7		477	5280.0	0.0	1	75	0.044604	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	10.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T3	3-Phase	100.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T7	3-Phase	15.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T10	3-Phase	0.500	11.000	0.415	5.20	5.10	0	0	0	0	0	5.2000	Dyn	0.000
T12	3-Phase	0.400	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	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	Bus1	Bus2	33.77	83.42	90.00	
T3	2W XFMR	Bus5	Bus4	3.38	8.34	9.00	
T7	2W XFMR	Bus8	Bus3	22.52	55.61	60.00	
T10	2W XFMR	Bus8	Bus9	200.11	1020.57	1040.00	
T12	2W XFMR	Bus6	Bus7	844.36	2085.56	2250.00	
Line1	Line	Bus3	Bus2	0.14	0.48	0.50	0.0895860
Line3	Line	Bus3	Bus4	0.14	0.48	0.50	0.0895860
Line7	Line	Bus5	Bus6	19.46	68.84	71.53	0.0006221

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	11.000	100.000	0.0	2.912	-0.119	0.340	0.211	Bus2	2.572	-0.330	136.1	-99.2	
Bus2	129.400	101.430	-1.3	0.000	0.000	0.000	0.000	Bus3	2.549	-0.386	11.3	-98.9	
								Bus1	-2.549	0.386	11.3	-98.9	
Bus3	129.500	101.350	-1.3	0.000	0.000	0.000	0.000	Bus2	-2.549	0.298	11.3	-99.3	
								Bus4	1.790	1.023	9.1	86.8	
								Bus8	0.759	-1.321	6.7	-49.8	
Bus4	129.400	101.421	-1.3	0.000	0.000	0.000	0.000	Bus3	-1.790	-1.111	9.3	85.0	
								Bus5	1.790	1.111	9.3	85.0	
Bus5	10.760	101.483	-1.4	0.000	0.000	1.695	1.050	Bus6	0.093	0.057	5.8	85.2	
								Bus4	-1.788	-1.108	111.2	85.0	
Bus6	10.760	101.424	-1.4	0.000	0.000	0.085	0.053	Bus5	-0.093	-0.058	5.8	85.0	
								Bus7	0.008	0.005	0.5	84.9	
Bus7	129.400	101.018	-1.5	0.000	0.000	0.008	0.005	Bus6	-0.008	-0.005	0.0	85.0	
* Bus8	10.800	101.852	-1.7	0.000	1.782	0.705	0.417	Bus3	-0.754	1.334	80.4	-49.2	
								Bus9	0.049	0.031	3.0	84.8	
Bus9	0.414	99.829	-2.0	0.000	0.000	0.049	0.030	Bus8	-0.049	-0.030	80.8	85.1	

* 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	11.000		0.272	0.169	0.068	0.042					2.931	99.4	153.8	
Bus2	129.400										2.578	98.9	11.3	
Bus3	129.500										2.871	88.8	12.6	
Bus4	129.400										2.107	85.0	9.3	
Bus5	10.760		1.360	0.843	0.335	0.208					2.104	85.0	111.2	
Bus6	10.760		0.068	0.042	0.017	0.010					0.110	85.0	5.8	
Bus7	129.400		0.007	0.004	0.002	0.001					0.010	85.0	-	
Bus8	10.800		0.586	0.343	0.119	0.074					1.935	39.0	101.6	
Bus9	0.414		0.041	0.025	0.008	0.005					0.058	85.1	80.8	

* 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	%
T1	Transformer				10.000	2.593	25.9	2.578	25.8
T3	Transformer				100.000	2.107	2.1	2.104	2.1
T7	Transformer				15.000	1.532	10.2	1.524	10.2
T10	Transformer				0.500	0.058	11.6	0.058	11.6
T12	Transformer				0.400	0.010	2.5	0.010	2.5

* 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
	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Line1	2.549	-0.386	-2.549	0.298	0.1	-88.3	101.4	101.4	0.00
Line3	1.790	1.023	-1.790	-1.111	0.1	-88.4	101.4	101.4	0.01
Line7	0.093	0.057	-0.093	-0.058	0.0	-0.5	101.5	101.4	0.06
T1	2.572	-0.330	-2.549	0.386	22.7	56.1	100.0	101.4	0.57
T10	0.049	0.031	-0.049	-0.030	0.1	0.3	101.9	99.8	0.42
T12	0.008	0.005	-0.008	-0.005	0.0	0.0	101.4	101.0	0.19
T3	1.790	1.111	-1.788	-1.108	1.5	3.7	101.4	101.5	0.16
T7	0.759	-1.321	-0.754	1.334	5.3	13.1	101.4	101.9	0.58
					29.8	-103.9			

* 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	Under Excited	0.000	Mvar	-0.119	0.0	3-Phase
Gen2	Generator	Under Excited	0.000	Mvar	0.000	0.0	3-Phase
Gen2	Generator	Under Power	0.000	MW	0.000	0.0	3-Phase
Gen3	Generator	Under Power	0.000	MW	0.000	0.0	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	2.912	-0.119	2.914	99.92 Leading
Source (Non-Swing Buses):	0.000	1.782	1.782	0.00 Lagging
Total Demand:	2.912	1.663	3.353	86.84 Lagging
Total Motor Load:	2.333	1.426	2.735	85.32 Lagging
Total Static Load:	0.549	0.340	0.646	85.00 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.030	-0.104		
System Mismatch:	0.000	0.000		

Number of Iterations: 2