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	8	9

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	0	0	0	0	11	0	11

Method of Solution:	Adaptive Newton-Raphson Method
Maximum No. of Iteration:	99
Precision of Solution:	0.0001000
System Frequency:	50.00 Hz
Unit System:	English
Project Filename:	NEW_PSA
Output Filename:	C:\ETAP 1901\NEW_PSA\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	103.0	0.0								
Bus 2	11.000	1	100.0	0.0	10.000	5.000						
Bus 3	11.000	1	100.0	0.0	25.000	15.000						
Bus 4	11.000	1	100.0	0.0	60.000	40.000						
Bus 5	11.000	1	100.0	0.0	10.000	5.000						
Bus 6	11.000	1	100.0	0.0	100.000	80.000						
Bus 7	11.000	1	100.0	0.0	80.000	60.000						
Bus 8	11.000	1	100.0	0.0	40.091	20.039						
Bus 9	11.000	1	100.0	0.0	16.000	8.000	4.000	2.000				
Total Number of Buses: 9					341.091	233.039	4.000	2.000	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	11.000	Swing	1	103.0	0.0					
Bus 5	11.000	Mvar/PF Control	1	100.0	0.0	80.000	94.118	64.8		
						80.000	94.118			

Impedance Input Data

Impedance	Positive Sequence Impedance			
ID	R	X	Y	Unit
Z1	1.8	5.4	0.9	% in 11.000 kV base and 100.0 MVA base
Z2	1.8	5.6	0	% in 11.000 kV base and 100.0 MVA base
Z3	1.5	4.5	0.76	% in 11.000 kV base and 100.0 MVA base
Z4	1.3	3.6	0.6	% in 11.000 kV base and 100.0 MVA base
Z5	2	6.6	0	% in 11.000 kV base and 100.0 MVA base
Z6	1	5	0	% in 11.000 kV base and 100.0 MVA base
Z7	1.4	3.6	0.6	% in 11.000 kV base and 100.0 MVA base
Z8	3.2	7.6	0	% in 11.000 kV base and 100.0 MVA base
Z10	2	6	0	% in 11.000 kV base and 100.0 MVA base
Z11	2.2	6.5	0	% in 11.000 kV base and 100.0 MVA base
Z12	6	3	0.56	% in 11.000 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
Z1	Impedance	Bus1	Bus 2	1.80	5.40	5.69	0.9000000
Z2	Impedance	Bus 2	Bus 3	1.80	5.60	5.88	
Z3	Impedance	Bus 4	Bus1	1.50	4.50	4.74	0.7600000
Z4	Impedance	Bus 5	Bus 4	1.30	3.60	3.83	0.6000000
Z5	Impedance	Bus 4	Bus 6	2.00	6.60	6.90	
Z6	Impedance	Bus 6	Bus 9	1.00	5.00	5.10	
Z7	Impedance	Bus 5	Bus 7	1.40	3.60	3.86	0.6000000
Z8	Impedance	Bus 7	Bus 8	3.20	7.60	8.25	
Z10	Impedance	Bus 9	Bus 3	2.00	6.00	6.32	
Z11	Impedance	Bus 8	Bus 9	2.20	6.50	6.86	
Z12	Impedance	Bus 5	Bus 6	6.00	3.00	6.71	0.5600000

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	103.000	0.0	283.033	187.938	0.000	0.000	Bus 2	90.185	64.213	5641.5	81.5	
								Bus 4	192.848	123.725	11675.6	84.2	
Bus 2	11.000	98.098	-2.1	0.000	0.000	10.000	5.000	Bus1	-88.095	-58.854	5668.5	83.2	
								Bus 3	78.095	53.854	5075.6	82.3	
Bus 3	11.000	93.655	-4.2	0.000	0.000	25.000	15.000	Bus 2	-76.412	-48.617	5075.6	84.4	
								Bus 9	51.412	33.617	3442.5	83.7	
Bus 4	11.000	94.999	-4.0	0.000	0.000	60.000	40.000	Bus1	-185.411	-102.160	11695.9	87.6	
								Bus 5	69.570	6.306	3859.5	99.6	
								Bus 6	55.841	55.855	4363.6	70.7	
Bus 5	11.000	93.833	-5.5	80.000	94.118	10.000	5.000	Bus 4	-68.867	-4.893	3861.9	99.7	
								Bus 7	89.073	73.454	6458.0	77.2	
								Bus 6	49.794	20.557	3013.3	92.4	
Bus 6	11.000	89.984	-5.7	0.000	0.000	100.000	80.000	Bus 4	-54.458	-51.293	4363.6	72.8	
								Bus 9	2.268	-8.669	522.7	-25.3	
								Bus 5	-47.809	-20.038	3023.7	92.2	
Bus 7	11.000	89.705	-7.0	0.000	0.000	80.000	60.000	Bus 5	-86.947	-68.493	6476.1	78.6	
								Bus 8	6.947	8.493	642.0	63.3	
Bus 8	11.000	88.738	-7.2	0.000	0.000	40.091	20.039	Bus 7	-6.899	-8.379	642.0	63.6	
								Bus 9	-33.192	-11.659	2080.8	94.3	
Bus 9	11.000	90.441	-5.9	0.000	0.000	19.272	9.636	Bus 6	-2.258	8.719	522.7	-25.1	
								Bus 3	-50.552	-31.036	3442.5	85.2	
								Bus 8	33.537	12.681	2080.8	93.5	

* 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										339.747	83.3	17312.7	
Bus 2	11.000		10.000	5.000							105.946	83.2	5668.5	
Bus 3	11.000		25.000	15.000							90.567	84.4	5075.6	
Bus 4	11.000		60.000	40.000							211.693	87.6	11695.9	
Bus 5	11.000		10.000	5.000							178.786	83.3	10000.6	
Bus 6	11.000		100.000	80.000							129.841	78.8	7573.4	
Bus 7	11.000		80.000	60.000							110.685	78.6	6476.1	
Bus 8	11.000		40.091	20.039							44.820	89.4	2651.0	
Bus 9	11.000		16.000	8.000	3.272	1.636					61.254	86.2	3554.8	

* 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 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
Z1	90.185	64.213	-88.095	-58.854	2090.0	5359.5	103.0	98.1	4.90
Z10	51.412	33.617	-50.552	-31.036	860.4	2581.1	93.7	90.4	3.21
Z11	-33.192	-11.659	33.537	12.681	345.8	1021.6	88.7	90.4	1.70
Z12	49.794	20.557	-47.809	-20.038	1984.6	519.0	93.8	90.0	3.85
Z2	78.095	53.854	-76.412	-48.617	1683.2	5236.7	98.1	93.7	4.44
Z3	192.848	123.725	-185.411	-102.160	7436.8	21564.3	103.0	95.0	8.00
Z4	69.570	6.306	-68.867	-4.893	703.4	1413.0	95.0	93.8	1.17
Z5	55.841	55.855	-54.458	-51.293	1382.4	4561.9	95.0	90.0	5.02
Z6	2.268	-8.669	-2.258	8.719	9.9	49.6	90.0	90.4	0.46
Z7	89.073	73.454	-86.947	-68.493	2125.7	4960.5	93.8	89.7	4.13
Z8	6.947	8.493	-6.899	-8.379	47.9	113.7	89.7	88.7	0.97
					18670.0	47381.0			

* 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
Bus 3	Bus	Under Voltage	11.000	kV	10.302	93.7	3-Phase
Bus 4	Bus	Under Voltage	11.000	kV	10.450	95.0	3-Phase
Bus 5	Bus	Under Voltage	11.000	kV	10.322	93.8	3-Phase
Bus 6	Bus	Under Voltage	11.000	kV	9.898	90.0	3-Phase
Bus 7	Bus	Under Voltage	11.000	kV	9.868	89.7	3-Phase
Bus 8	Bus	Under Voltage	11.000	kV	9.761	88.7	3-Phase
Bus 9	Bus	Under Voltage	11.000	kV	9.948	90.4	3-Phase
Gen2	Generator	Overload	80.000	MW	80.000	100.0	3-Phase
Gen2	Generator	Over Excited	49.580	Mvar	94.118	189.8	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus1	Bus	Over Voltage	11.000	kV	11.330	103.0	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	283.033	187.938	339.747	83.31 Lagging
Source (Non-Swing Buses):	80.000	94.118	123.524	64.76 Lagging
Total Demand:	363.033	282.056	459.726	78.97 Lagging
Total Motor Load:	341.091	233.039	413.098	82.57 Lagging
Total Static Load:	3.272	1.636	3.658	89.44 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	18.670	47.381		
System Mismatch:	0.000	0.000		

Number of Iterations: 4