

Project: **ETAP**
Location: 7.0.0E
Contract:
Engineer:
Filename: rrr2
Study Case: LF

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Date: 18-04-2022
SN: SSNCOLEGE2
Revision: Base
Config.: Normal

Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design
Generation Category (1): Design
Load Diversity Factor: None

	<u>Swing</u>	<u>V-Control</u>	<u>Load</u>	<u>Total</u>
Number of Buses:	1	1	1	3

	<u>XFMR2</u>	<u>XFMR3</u>	<u>Reactor</u>	<u>Line/Cable</u>	<u>Impedance</u>	<u>Tie PD</u>	<u>Total</u>
Number of Branches:	0	0	0	0	3	0	3

Method of Solution: Newton-Raphson Method
Maximum No. of Iteration: 99
Precision of Solution: 0.0001000

System Frequency: 50 Hz
Unit System: Metric
Project Filename: rrr2
Output Filename: C:\Users\SSLab\Desktop\rrr2\rrr2.lfr

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Adjustments

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

<u>Temperature Correction</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Degree C</u>
Transmission Line Resistance:	Yes	Individual	
Cable 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	100.000	1	105.0	0.0								
Bus2	100.000	1	100.0	0.0	400.000	250.000						
Bus3	100.000	1	104.0	0.0								
Total Number of Buses: 3					400.000	250.000	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	100.000	Swing	1	105.0	0.0					
Bus3	100.000	Voltage Control	1	104.0	0.0	200.000			588.235	-588.235
						200.000	0.000			

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Impedance Input Data

Impedance	Positive Sequence Impedance			Unit	
ID	R	X	Y		
Z1	2	4	0		% in 100.000 kV base and 100.0 MVA base
Z2	1	3	0		% in 100.000 kV base and 100.0 MVA base
Z3	1.25	2.5	0		% in 100.000 kV base and 100.0 MVA base

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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	Bus2	Bus1	2.00	4.00	4.47	
Z2	Impedance	Bus1	Bus3	1.00	3.00	3.16	
Z3	Impedance	Bus2	Bus3	1.25	2.50	2.80	

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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	100.000	105.000	0.0	218.423	140.851	0	0	Bus2	179.362	118.734	1182.7	83.4		
								Bus3	39.061	22.118	246.8	87.0		
Bus2	100.000	97.168	-2.7	0	0	400.000	250.000	Bus1	-170.968	-101.947	1182.7	85.9		
								Bus3	-229.032	-148.053	1620.4	84.0		
* Bus3	100.000	104.000	-0.5	200.000	146.177	0	0	Bus1	-38.878	-21.569	246.8	87.4		
								Bus2	238.878	167.746	1620.4	81.8		

* 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		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus1	100.000		0	0	0	0	0	0	0	0	259.899	84.0	1429.1	
Bus2	100.000		400.000	250.000	0	0	0	0	0	0	471.699	84.8	2802.7	
Bus3	100.000		0	0	0	0	0	0	0	0	291.893	81.8	1620.4	

* 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).

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Branch Loading Summary Report

CKT / Branch		Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%

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

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Branch Losses Summary Report

CKT / 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	
Z1	179.362	118.734	-170.968	-101.947	8393.4	16786.7	105.0	97.2	7.83
Z2	39.061	22.118	-38.878	-21.569	182.8	548.3	105.0	104.0	1.00
Z3	-229.032	-148.053	238.878	167.746	9846.7	19693.4	97.2	104.0	6.83
					18422.8	37028.4			

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Alert Summary Report

% Alert Settings

<u>Loading</u>	<u>Critical</u>	<u>Marginal</u>
Bus	100.0	95.0
Cable	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
<u>Bus Voltage</u>		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
<u>Generator Excitation</u>		
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
Bus1	Bus	Over Voltage	100.000	kV	105.000	105.0	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus2	Bus	Under Voltage	100.000	kV	97.168	97.2	3-Phase
Bus3	Bus	Over Voltage	100.000	kV	104.000	104.0	3-Phase

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SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	218.423	140.851	259.899	84.04 Lagging
Source (Non-Swing Buses):	200.000	146.177	247.725	80.73 Lagging
Total Demand:	418.423	287.028	507.408	82.46 Lagging
Total Motor Load:	400.000	250.000	471.699	84.80 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:	18.423	37.028		
System Mismatch:	0.000	0.000		

Number of Iterations: 1

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Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design

Generation Category (1): Design

Load Diversity Factor: None

	<u>Swing</u>	<u>V-Control</u>	<u>Load</u>	<u>Total</u>
Number of Buses:	1	1	1	3

	<u>XFMR2</u>	<u>XFMR3</u>	<u>Reactor</u>	<u>Line/Cable</u>	<u>Impedance</u>	<u>Tie PD</u>	<u>Total</u>
Number of Branches:	0	0	0	0	3	0	3

Method of Solution: Fast-Decoupled Method

Maximum No. of Iteration: 99

Precision of Solution: 0.0001000

System Frequency: 50 Hz

Unit System: Metric

Project Filename: rrr3

Output Filename: C:\Users\SSLab\Desktop\rrr3\rrr3.lfr