Power Line Systems

2022 PLS-CADD Advanced Training and User Group

Electrical Features Update

Nathan Brazy **Power Line Systems**

by



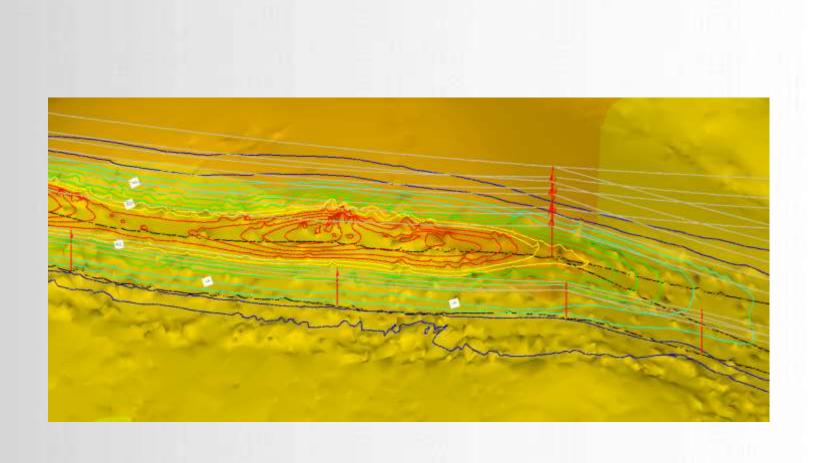
IT'S ALL ABOUT YOUR POWER LINES



IT'S THE SOLUTION

Introduction

- Circuit Labeling
- Full Line Constants
- 3D EMF
- Structure Space Potential



6/16/2022

Power Line Systems

Circuit Labeling

PLS-CADD

- Filtering for Reports
- Configure Sections by Circuit

Section Information by Circuit

Use this table to update the voltage, current read display compliants for all sections which use these caread labors

plane Structur	-	
Selective shace	ites to use	
C18 C11 C_Stop		
CR2 S_Tep_W CR3		
N, THE JAY DIA TTS		
11 23 07		
CC1 Roomt_W		
River_E C22		
N_Tep:_E C21		
Select A4	SelectNore	Select by Groups
Selector summ	M91.	
Shutana N. To Circuity N.CATC		

PLS-GRID
Grid Map View

Circuit Label	Voltage Pro-Pro (KV)	Current (Amps)	Display Weather Case	Display Condition	Display Wind Dir
Overhead Ground Wires	0.0	0.0	060 Deg F	Max Sag TB	Left
Communication Wires	0.0	0.1	5160 Deg F	Max Sag FE	left
r cu	345.0	700.0	0.60 Deg #	Max Sag FE	Left
C CAt	345.0	600.0	0.60 Deg F	Max Seg FK	Left
ja da	345.0	560	360 Deg #	Max 5ag FE	Left

OK Smicht

Power Line Systems

_		Display Condition	Display Wind
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ielez AJ	Selectrone	4	
ougred 74 111		-	
Select All	Select None		
munication We			
rtward Ground V	dana .	-	
stigned.			

Full Line Constants

Mutual Coupling Adjacent Spans

Earth Resistivity - By Structure

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		4							
Cont	tanti Results	1						Se	
-									
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			ance by Cir ling		ter	Bero Seq	145.08		Î
cuit	Coupled with	Coupl Start	ling	Hinimum Cable	Aveza	ge	Tota	L	Î
cuit	Coupled with	Coupl Start	ling	Minimum Cable Length	Avera Resistance	ge Reactance	Tota Resistance	Reactance	
cuit	Coupled with	Coupl Start	ling	Hinimum Cable	Aveza	ge	Tota	L	
cuit shel	Coupled with Circuit	Coup: Start Structure	ling	Minimum Cable Length (milee) 2.4	Avera Resistance (Ohn/mile) 0,45216	ge Reactance (Ohm/mile)	Tota Resistance (Ohm)	Reactance (Ohn) 4.13994	
cuit shel	Coupled with Circuit S Ckt S Ckt S Ckt	Coup Start Structure	End Structure 3_Tup_E 3_Tup_E	Minimum Cable Length (miles) 2.4 2.3	Avera Resistance (Ohm/mile) 0,45216 0,40099	ge Reactance (Ohn/mlle) 1.72544 1.57961	Tota Resistance (Oheo) 1.18086 1.11753	Reactance (obm) 4.13954 3.67004	
cuit abel Ckt Ckt	Coupled with Circuit S Ckt S Ckt C Ckt	Coup Start Structure 3_Tap_W 5_Tap_W NITO	Biruoture Biruoture Biruoture Biruoture Biruoture Biruoture Biruoture Biruoture	Minimum 1 Cable 1 Length 1 (miles) 1 2.4 2.3 0.3	Avera Resistance (Chm/mile) 0,46216 0,40099 0,43220	ge Reactance (Ohm/mile) 1.72544 1.57961 0.07190	Tota Resistance (Oheo) 1.18086 1.11753 0.01964	Kestance (Obs) 4,13904 3,67004 0,18088	
cuit abel Ckt Ckt Ckt	Coupled with Circuit S Cit M Cit C Cit S Cit S Cit	Coup Start Structure S_Tap_W S_Tap_W N13D N13D	Bing Btructure S_Tap_E S_Tap_E NISD HISD	Minimum 1 Cable 1 Length 1 (miles) 1 2.4 2.3 0.2 0.2		ge Reactance (Ohm/mile) 1.72544 1.57961 0.07190 0.83247	Tota Resistance (Ohm) 1.18086 1.11753 0.00064 0.00042	Reactance (Chm) 4.13994 3.67004 0.10000 0.17270	
cuit abel Cks Cks Cks Cks Cks	Coupled with Circuit S Cist S Cist C Cist S Cist C Cist	Coup Start Structure S_Tap_W S_Tap_W NIID N_Tap_W S_Tap_W	Baructure Baructure Baructure Barup E Barup E Niso Nator Nator	Hinimum Cable Length (milee) 2.4 2.3 0.2 0.2 1.9	- Avera Resistance (Ohn/mile) 0,46216 0,40099 0,43220 0,43220 0,436211 0,49003	ge Feactance (Ohm/mile) 1.72544 1.57941 0.07100 0.83247 1.74677		Beactance (Otm) 4.12994 3.67004 0.18088 0.17270 3.25424	
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cuit abel cks cks cks cks cks cks cks	Coupled with Circuit S Cit S Cit S Cit C Cit S Cit S Cit C Cit S Cit C Cit S Cit C Cit	Coup Start Structure 3_Tap_W S_Tap_W N15D N_Tap_W N16D N16D N16D N16D N16D	Iing End Structure 3_Tap_R 3_Tap_R N150 N Tap_R N170 N170 N170 S_Tap_R 3_Tap_R	Hinimum Cable Length (mlles) 2.4 2.3 0.2 0.2 1.5 1.5 1.5 0.2 0.2 2.4	Avera Resistance (Chm/mile) 0.45216 0.40296 0.43220 0.432621 0.432621 0.45025 0.45021 0.44321 0.42343 0.45218	ge Reactance (Ohm/mlle) 1.72544 1.57961 0.07190 0.82347 1.74677 1.73021 0.64329 0.82631 1.72539	Tota Resistance (Oba) 1.18086 1.11752 0.08044 0.00044 0.00042 0.32577 0.80817 0.10056 0.09740 1.10072	Beattance (Ohm) 4.13994 3.47004 0.10088 0.17270 3.25428 3.26301 0.18133 0.18979 4.13904	
cuit abel ckx ckx ckx ckx ckx ckx ckx ckx ckx ckx	Coupled with Circuit S Cit S C	Coup Start Structure S_TAP_W S_TAP_W NI3D N TAP_W NTAP_W NTAP NIED NIED	1111 Rnd Structure 3_Tap_R 3_Tap_R N150 N_Tap_S N_Tap_S N_Tap_S N180 N180 N180	Hinimum Cable Length Called Cable 1 2.4 2.3 0.2 0.2 0.2 1.5 1.5 0.2 0.2 0.2	Avera Resistance (Ohm/mile) 0,45216 0,45095 0,43200 0,43220 0,432621 0,49005 0,46671 0,44321 0,44321	<pre>ge (obm/mile) 1.72544 1.57941 0.07190 0.43247 1.74677 1.73021 0.04329 0.4329 0.43251</pre>	Tota Resistance (Ohm) 1.10006 1.11752 0.00964 0.00964 0.52577 0.89817 0.10056 0.09748	Beattance (Otm) 4,13994 3,47004 0,18088 0,17270 3,25424 3,26301 0,19133 0,19379	
	Coupled with Circuit S Cit S Cit S Cit C Cit S Cit S Cit C Cit S Cit C Cit S Cit C Cit	Coup Start Structure 3_Tap_W S_Tap_W N15D N_Tap_W N16D N16D N16D N16D N16D	Iing End Structure 3_Tap_R 3_Tap_R N150 N Tap_R N170 N170 N170 S_Tap_R 3_Tap_R	Hinimum Cable Length (mlles) 2.4 2.3 0.2 0.2 1.5 1.5 1.5 0.2 0.2 2.4	Avera Resistance (Chm/mile) 0.45216 0.40296 0.43220 0.432621 0.432621 0.45025 0.45021 0.44321 0.42343 0.45218	ge Reactance (Ohm/mlle) 1.72544 1.57961 0.07190 0.82347 1.74677 1.73021 0.64329 0.82631 1.72539	Tota Resistance (Oba) 1.18086 1.11752 0.08044 0.00044 0.00042 0.32577 0.80817 0.10056 0.09740 1.10072	Beattance (Ohm) 4.13994 3.47004 0.10088 0.17270 3.25428 3.26301 0.18133 0.18979 4.13904	

Table 2-9. Effect of Moisture Content on Earth Resistivity

Moisture Content	Resistivity, ohm-cm		
% By Weight	Top Soil	Sandy Loam	
0	1,000	x 10 ⁴ 1,000 x 10	
2.5	250,000	150,000	
5	165,000	43,000	
10	53,000	18,500	
15	17,000	10,500	
20	12,000	6,300	
30	6,400	4,200	

oC.
20
10
0
0
-5
-15

6/16/2022

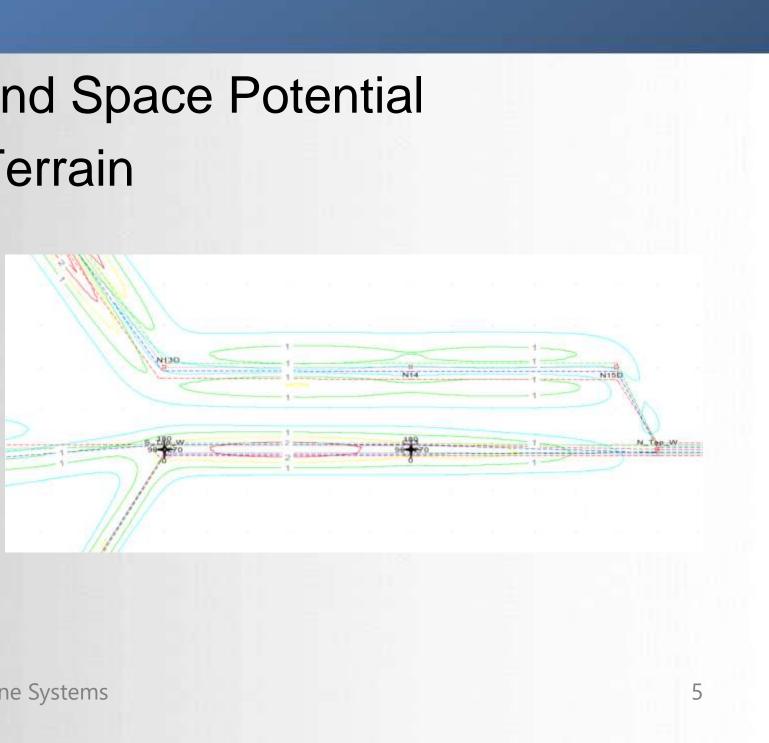
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Table 2-10. Effect of Temperature on Earth Resistivity *

mperature		Resistivity	
	oF	59	ohm-cm
	68		7,200
	50		9,900
	32	(water)	13,800
	32	(ice)	30,000
	23		79,000
	5		330,000

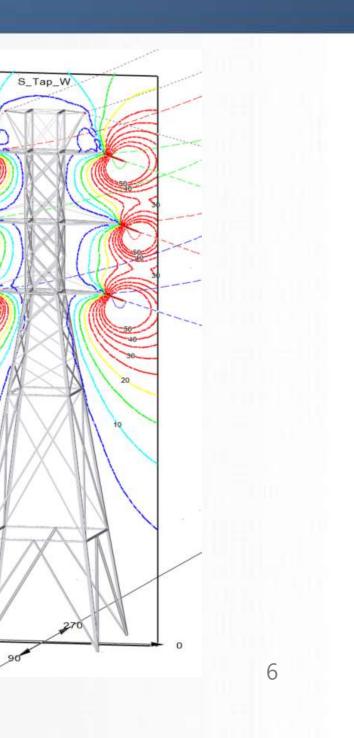
3D EMF

- Electric & Magnetic Fields and Space Potential
- **3D Model of All Wires and Terrain**
- **Multiple Spans**
- **Effects of Adjacent Spans**
- **Ground TIN Contour Map**
- Calculate Along Line
- **Fully Multithreaded**



Structure Space Potential

- Space Potential and Magnetic Fields
- 3D Model
- Multiple Structures
- Accounts for Structure Geometry
- Includes Jumpers
- Cross Section Contour Plot



PLS Resources

- Website: <u>www.powerlinesystems.com</u>
- Tech Notes
 - "Defining and Labeling Circuits and Electrical Phasing"
 - "Full Line Constants Feature"
- Videos
 - "Defining and Labeling Circuits and Electrical Phasing"
 - "3D EMF Calculator"
 - "Structure Space Potential Calculations"

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FAC 008/009 LiDAR Modeling CSA Distribution Line Optimization

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