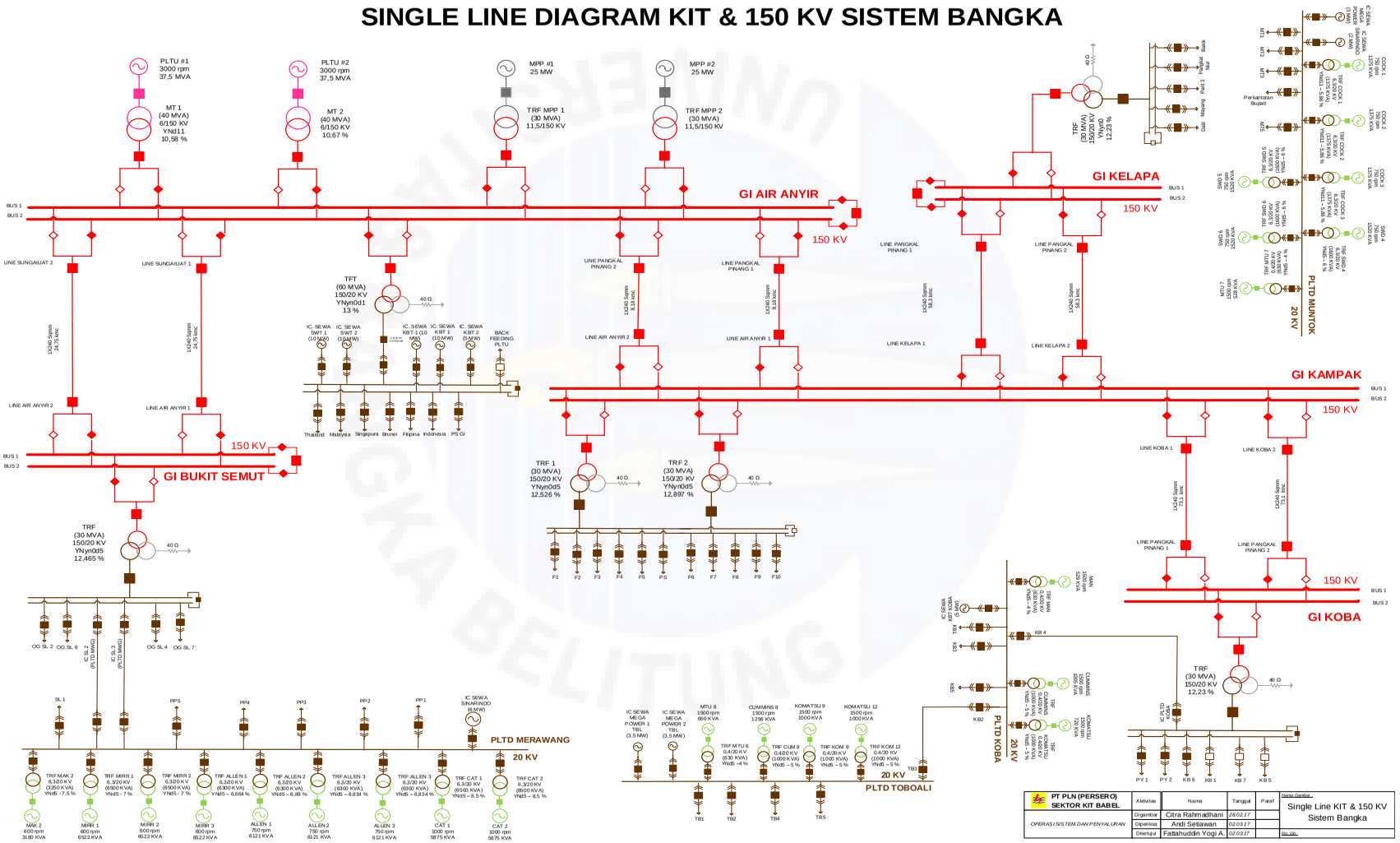
LAMPIRAN–LAMPIRAN

LAMPIRAN A

SINGLE LINE DIAGRAM KIT & 150 KV SISTEM BANGKA



PT PLN (PERSERO) SEKTOR KIT BABEL		Nama	Tanggal	Paraf	Nama Gambar :
OPERASI SISTEM DAN PENYALURAN	Diperiksa	Andi Setiawan	02.03.17		Single Line KIT & 150 KV Sistem Bangka
	Digambar	Citra Rahmadhani	28.02.17		
	Disetujui	Fattahuddin Yogi A.	02.03.17		No. Gb.

LAMPIRAN B

DATA PEMBANGKIT AREA BANGKA

No.	PEMBANGKIT	BASIC DATA			LOAD FLOW						Complete SC				
		S (MVA)	V (kV)	pF	xd (pu)	xq (pu)	x0 (pu)	r0 (pu)	x2 (pu)	r2 (pu)	r str (pu)	xd' (pu)	xd'' (pu)	xq' (pu)	xq'' (pu)
AIR ANYIR															
1	PLTU Unit 1	37,500	6300	0.85	2.297		0.073		0.1696			0.233	0.189		
2	PLTU Unit 2	37,500	6300	0.85	2.297		0.073		0.1696			0.233	0.189		
PLTGU															
3	PLTG MPP Unit 1	30800	11500	0.9	2.65	2.12	0.132	0.0162	0.2620	0.0532		0.32	0.247	0.39	0.3
4	PLTG MPP Unit 2	30800	11500	0.9	2.65	2.12	0.132	0.0162	0.2620	0.0532		0.32	0.247	0.39	0.3
PLTD MERAWANG															
5	MAK	3.180	6.300	0.80											
6	MIRRLEES 1	6.522	6.300	0.80											
7	MIRRLEES 2	6.522	6.300	0.80											
8	ALLEN 1	6.121	6.300	0.80											
9	ALLEN 2	6.121	6.300	0.80											
10	ALLEN 3	6.121	6.300	0.80											
11	CATERPILLAR 1	5.875	6.300	0.80											
12	CATERPILLAR 2	5.875	6.300	0.80											
13	MIRRLEES 3	6.522	6.300	0.80											

LAMPIRAN C

Tabel 2. Data Daya Mampu dan Konstanta Inersia Pembangki-Pembangkit Sistem Sulawesi Selatan

SEKTOR / CABANG	UNIT PEMBANGKIT	JML UNIT	DAYA MAMPU (MVA)	KONSTANTA INERSIA	
				($^{MW.Sec}/_{MVA}$)	MW.Sec
Sektor Bakaru	PLTA Bakaru 1	1	63	2.97	187.11
	PLTA Bakaru 1	1	63	2.97	187.11
Sektor Tello	PLTU Unit 1	1	12.5	5	62.5
	PLTU Unit 2	1	12.5	5	62.5
	PLTG Westcan	1	14.47	7	101.29
	PLTG Alsthom 1	1	21.35	7	149.45
	PLTG Alsthom 2	1	21.10	7	149.45
	PLTD Mitsubishi 1	1	12.6	1.02	12.852
	PLTD Mitsubishi 2	1	12.6	1.02	12.852
	PLTD SWD 1	1	12.4	1.26	15.624
	PLTD SWD 2	1	12.4	1.26	15.624
	PLTG GE 1	1	33.4	5.1	170.34
	PLTG GE 2	1	33.4	5.1	170.34
PT E. Sengkang	PLTGU GT 11**	1	50	3.23	161.5
	PLTGU GT 12**	1	50	3.23	161.5
	PLTGU ST 18**	1	65	3.23	209.95
	PLTGU ext*,**	1	60	3.23	193.8
PT MP	PLTD Suppa	6	64.8	5.41	350.568
PT	PLTD Sewatama	15	15	1.25	18.75
Cab. Palopo	PLTD Makale**	8	4.58	0.38	1.74
	PLTD Palopo**	4	6.5	0.54	3.51
	PLTD Masamba**	4	2.42	0.20	0.484
	PLTD Stma Palopo	6	6	0.50	3.0
Cab. Pinrang	PLTM Sawitto**	3	1.02	0.05	0.051
	PLTD Mamuju**	8	2.4	0.2	0.48
Cab.	PLTD Bili-Bili**	2	20	0.94	18.8

Sumber : Data momen inersia unit-unit Pembangkit Sistem Sulawesi Selatan

LAMPIRAN D

DATA TRAFO DAYA GARDU INDUK DAN PEMBANGKIT

No	Lokasi	Unit	Merk	Kapasitas	Tegangan		Circuit Breaker		Vector	Impedansi
				(MVA)	(kV)		Primer	Sekunder	Group	(%)
					Primer	Sekunder	kA	kA		
	1	2	3	4	5	6	7	8	9	10
I	**TRAFO GARDU INDUK**									
	GI Air Anyir									
1	TFT		GEC ALSTHOM	60.000	150.000	20.000	40.000	25.000	YNyn0d1	13
	GI Pangkal Pinang									
1	Trafo 1		PAUWELS	30.000	150.000	20.000	40.000	25.000	YNyn0d5	12.526
2	Trafo 2		PAUWELS	30.000	150.000	20.000	40.000	25.000	YNyn0d5	12.897
	GI Sungailiat									
1	Trafo		PAUWELS	30.000	150.000	20.000	40.000	25.000	YNyn0d5	12.465
II	**TRAFO PEMBANGKIT**									
	PLTU Air Anyir									
1	MT 1		JINAN	40.000	6.300	154.000		40.000	YNd11	10.58
2	MT 2		JINAN	40.000	6.300	154.000		40.000	YNd11	10.67
	PLTD Koba									
1	MAN		SINTRA	0.630	0.400	20.000		36.500	YNd5	4
2	Cummins		UNINDO	1.000	0.400	20.000		36.500	YNd5	5
3	Komatsu		SINTRA	1.000	0.400	20.000		36.500	YNd5	5
	PLTD Muntok									
1	Cockerill 1		ACEC	1.375	6.300	20.920		12.500	YNd11	5.86
2	Cockerill 2		ACEC	1.375	6.300	20.920		12.500	YNd11	5.86
3	Cockerill 3		ACEC	1.375	6.300	20.920		12.500	YNd11	5.86
4	SWD 4		PT. ASATA UTAMA ELEC	1.600	6.300	20.000		16.000	YNd5	6
5	SWD 5		PT. ASATA UTAMA ELEC	1.600	6.300	20.000		16.000	YNd5	6
6	SWD 6		PT. ASATA UTAMA ELEC	1.600	6.300	20.000		16.000	YNd5	6
7	MTU 7		SINTRA	0.630	0.400	20.000		36.500	YNd5	4
8	Mirrlees 8		UNINDO	3.250	6.300	20.000		12.500	YNd5	7.5
	PLTD Toboali									
1	MAN 5		SINTRA	0.630	0.400	20.000		36.500	YNd 5	4
2	MTU 6		SINTRA	0.630	0.400	20.000		36.500	YNd5	4
3	CUMMINS 8		UNINDO	1.000	0.400	20.000		36.500	YNd5	5
4	KOMATSU 9		UNINDO	1.000	0.400	20.000		36.500	YNd5	5
5	KOMATSU 12		SINTRA	1.000	0.400	20.000		36.500	YNd5	5
	PLTD Merawang									
1	MAK		UNINDO	3.250	6.300	20.500		16.000	YNd5	7.5
2	MIRRLEES 1		UNINDO	6.500	6.300	21.000		16.000	YNd5	7
3	MIRRLEES 2		UNINDO	6.500	6.300	21.000		16.000	YNd5	7
4	ALLEN 1		PAUWELS	6.300	6.300	20.000		63.000	YNd5	6.664
5	ALLEN 2		PAUWELS	6.300	6.300	20.000		63.000	YNd5	6.89
6	ALLEN 3		PAUWELS	6.300	6.300	20.000		63.000	YNd5	6.834
7	CATERPILLAR 1		TRAFINDO	6.500	6.300	20.000		40.000	YNd5	8.5
8	CATERPILLAR 2		TRAFINDO	6.500	6.300	20.000		40.000	YNd5	8.5
9	MIRRLEES 3		UNINDO	6.500	6.300	21.000		16.000	YNd5	7

LAMPIRAN E

DATA PARAMETER SALURAN TRANSMISI TEGANGAN TINGGI

Section		Tegangan Kerja (kV)	JENIS / PENAMPANG	Single/Bundle Cond	Type Tower	Circuit Breaker				JARAK (km)	Impedansi per km			Impedansi Total		
						Asal		Tujuan			R+	X+	B+	R+	X+	B+
Asal	Tujuan					Amp	kA	Amp	kA		ohm	ohm	mS	ohm	ohm	mS
1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18
GI Air Anyir (Pangkal Pinang 1)	GI Pangkal Pinang (Air Anyir 1)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	8.18	0.122	0.407	2.898	1.000	3.332	23.706
GI Air Anyir (Pangkal Pinang 2)	GI Pangkal Pinang (Air Anyir 2)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	8.18	0.122	0.407	2.898	1.000	3.332	23.706
GI Air Anyir (Sungailiat 1)	GI Sungailiat (Air Anyir 1)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	24.75	0.122	0.407	2.898	3.024	10.081	71.725
GI Air Anyir (Sungailiat 2)	GI Sungailiat (Air Anyir 2)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	24.75	0.122	0.407	2.898	3.024	10.081	71.725
GI Kampak (Kelapa 1)	GI Kelapa (Pangkal Pinang 1)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	58.3	0.122	0.407	2.898	7.124	23.746	168.953
GI Kampak (Kelapa 2)	GI Kelapa (Pangkal Pinang 2)	150	ACSRr 1x240 mm2	Single		3150	40	3150	40	58.3	0.122	0.407	2.898	7.124	23.746	168.953

LAMPIRAN F

DATA BEBAN PENYULANG

NO	PENYULANG	PEMBANGKIT / GI	R	S	T	ARUS RATA-RATA		BEBAN (KW)
1	Selindung (PP1)	PLTD MERAWANG	91	88	92	90	90	2,657
2	Riding Panjang (PP2)		0			-	-	-
3	Greenland (PP3)		61	62	63	62	62	1,823
4	Sempan (PP4)		102	104	108	105	104	3,078
5	Pangkalan baru (PP5)		70	68	68	69	68	2,019
6	Metro (PP6)		0			-	-	-
7	Girimaya(PP7)		0			-	-	-
8	Parit padang (SL1)		85	84	82	84	83	2,461
9	Lubuk kelik (SL2)		28	28	32	29	29	863
10	A Yani (SL3)		32	26	30	29	29	863
11	Batu rusa (OG A. Anyir)	GI AIR ANYIR	0	0	0	-	-	-
12	Jembatan Emas (OG Batu rusa)		0	0	0	-	-	-
13	Pangkal balam (OG PKL balam)		164	164	164	164	164	4,823
14	Propinsi (OG Propinsi)		147	147	147	147	147	4,323
15	Soekarno hatta (Thailand)		0	0	0	-	-	-
16	Gabek (Pilipina)		0	0	0	-	-	-
17	Kacang Pedang (F1)	GI PANGKALPINANG	106	103	103	104	104	3,059
18	Gandaria (F2)		92	97	89	93	92	2,725
19	Lampur (F3)		133	134	138	135	135	3,970
20	Kodim (F4)		157	157	160	175	175	5,157
21	Bukit Intan (F5)		176	177	173	156	156	4,598
22	Siloam (F6)		155	157	157	38	38	1,118
23	BTC (F7)		39	39	36	69	69	2,039
24	pasar pagi (F8)		69	69	70	46	46	1,353
25	Kampung jeruk (F9)		46	47	45	14	14	422
26	Cengkong abang (F10)		14	15	14	14	14	422
27	Air ruay (OG SL2)	GI SUNGAILIAT	120	120	120	120	120	3,529
28	Belinyu (OG SL4)		120	120	120	120	120	3,529
29	Tanjung Pesona (OG SL6)		173	173	173	173	173	5,088
30	Parai (OG SL7)		100	100	100	100	100	2,941
31	Berok (KB1)	PLTD KOBA	35	34	35	35	34	1,020
32	Nibung(KB2)		54	54	54	54	54	1,588
33	Terentang (KB3)		38	38	39	38	38	1,127
34	Kopling GI Koba		20	13	19	17	17	510
35	Beriga (KB5)		33	32	34	33	33	971
36	Kulur (KB6)	GI KOBA	40	40	39	40	39	1,167
37	Padang Mulia (KB7)		21	21	20	21	20	608
38	INC PLTD		19	22	23	21	21	627
39	Palas (PY 1)		52	50	50	51	50	1,490
40	Paku (PY 2)		122	124	123	123	123	3,617
41	Kota (TB1)	TOBOALI	87	90	90	89	89	2,617
42	Rindik (TB2)		29	30	30	30	29	872
43	Bikang (TB3)		17	14	18	16	16	480
44	Sadai (TB4)		54	51	54	4	4	118
45	Suka damai (TB5)		44	39	43	42	42	1,235
46	Tanjung Ular (MT1)	MENTOK	68	68	68	68	68	2,000
47	Air Belo (MT2)		36	38	39	38	37	1,108
48	Kundi (MT3)		39	39	39	39	39	1,147
49	Teluk Rubia (MT5)		33	33	33	33	33	971
50	Kotawaringin (F1)	PLTD LISTRINDO	42	46	43	44	43	1,284
51	Penyampak (F2)		11	11	12	11	11	333
52	PLTD PONGOK					#DIV/0!	#DIV/0!	#DIV/0!
53	PLTD CELAGEN					#DIV/0!	#DIV/0!	#DIV/0!
54	Dalil	GI KELAPA	42	41	42	42	41	1,225
55	Mayang		17	21	21	20	19	578
56	Parit 3		96	99	99	98	98	2,882
57	Pkl Niur		50	50	49	50	49	1,461
58	Bakik		25	25	24	25	24	725

LAMPIRAN G

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	6.300	100.000	0.0	-33.834	46.201	0	0	Bus2	-33.834	46.201	5247.9	-59.1	
Bus2	20.000	94.718	2.5	0	0	13.764	10.322	Bus 3	-25.399	15.632	909.0	-85.2	
								Bus 3	-22.313	16.348	843.0	-80.7	
								Bus1	33.949	-42.302	1653.1	-62.6	
Bus 3	20.000	95.795	16.5	0	0	15.087	9.349	Bus2	28.745	-9.140	909.0	-95.3	
								Bus2	25.892	-10.595	843.0	-92.6	
								GI SUNGAILIAT	-69.724	10.386	2124.3	-98.9	
* Bus7	8.900	100.000	36.0	119.525	49.207	0	0	GI AIR ANYIR	119.525	49.207	8385.1	92.5	
GI AIR ANYIR	150.000	96.802	31.2	0	0	9.153	5.669	GI SUNGAILIAT	35.405	3.877	141.6	99.4	
								GI SUNGAILIAT	35.405	3.877	141.6	99.4	
								GI PANGKALPINANG	19.646	12.225	92.0	84.9	
								GI PANGKALPINANG	19.646	12.225	92.0	84.9	
								Bus7	-119.255	-37.873	497.5	95.3	
GI PANGKALPINANG	150.000	96.556	31.1	0	0	39.241	24.318	GI AIR ANYIR	-19.620	-12.159	92.0	85.0	
								GI AIR ANYIR	-19.620	-12.159	92.0	85.0	
GI SUNGAILIAT	150.000	96.170	30.4	0	0	0	0	GI AIR ANYIR	-35.223	-3.374	141.6	99.5	
								GI AIR ANYIR	-35.223	-3.374	141.6	99.5	
								Bus 3	70.447	6.747	283.2	99.5	

* 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

LAMPIRAN H

Script Pembentukan Matriks dan Reduksi Matriks untuk Gangguan pada Bus GI Pangkalpinang

1. Selama Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+(1/(0.0044
+0.0148i)+1/(0.0044+0.0148i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i/2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+1/(0.3375+0.6549i)
Y45=1/(0.3375+0.6549i)
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=1/(0.3375+0.6549i)
Y55=(0.164-0.102i)+1/0.4155i+1/(0.3375+0.6549i)
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y74=0
Y75=0
Y76=0
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
0.259i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
```

```
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

2. Setelah Gangguan

```
Y11=1/(0.2i+0.074i);
Y12=0;
Y13=1/(0.2i+0.074i);
Y14=0;
Y15=0;
Y16=0;
Y21=0;
Y22=1/0.133i;
Y23=0;
Y24=1/0.133i;
Y25=0;
Y26=0;
Y31=1/(0.2i+0.074i);
Y32=0;
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(1/(0.0
    134+0.0448i)+1/(0.0134+0.0448i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i
    /2;
Y34=0;
Y35=0;
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i));
Y41=0;
Y42=1/0.133i;
Y43=0;
Y44=(1/0.133i)+(0.148-0.092i)+(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y45=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y46=0;
Y51=0;
Y52=0;
Y53=0;
Y54=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y55=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))+(0.164-0.102i)+1/0.4155i;
Y56=1/0.4155i;
Y61=0;
Y62=0;
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i));
Y64=0;
Y65=1/0.4155i;
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
    ;
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y41=-(Y41)
y42=-(Y42)
```

```
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16;y23 y24 y25 y26]
M=[y33 y34 y35 y36;y43 y44 y45 y46;y53 y54 y55 y56;y63 y64 y65 y66]
LT=[y31 y32;y41 y42;y51 y52;y61 y62]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

Script Pembentukan dan Reduksi Matriks untuk Gangguan pada Saluran yang Menghubungkan GI Air Anyir dan GI Pangkalpinang

1. Selama Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/(0.00
    44+0.0148i)+1/(0.0022+0.0074i)+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i/2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=1/(0.0044+0.0148i)
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y45=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y55=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))+(0.164-0.102i)+1/0.4155i
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=1/(0.0044+0.0148i)
Y74=0
Y75=0
Y76=0
Y77=1/(0.0044+0.0148i)+(0.418-
    0.259i)+1/(0.0022+0.0074i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
```

```
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
   y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

2. Setelah Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/(0.00
    44+0.0148i)+0.1054i/2+0.3188i/2+0.3188i/2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=1/(0.0044+0.0148i)
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y45=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))
Y55=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))+(0.164-0.102i)+1/0.4155i
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=1/(0.0044+0.0148i)
Y74=0
Y75=0
Y76=0
Y77=1/(0.0044+0.0148i)+(0.418-0.259i)+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
```

```
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
    y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

Script Pembentukan dan Reduksi Matriks untuk Gangguan pada Saluran yang Menghubungkan GI Air Anyir dan GI Sungailiat

1. Selama Gangguan

```
Y11=1/(0.2i+0.074i);
Y12=0;
Y13=1/(0.2i+0.074i);
Y14=0;
Y15=0;
Y16=0;
Y17=0;
Y21=0;
Y22=1/0.1i;
Y23=0;
Y24=1/0.1i;
Y25=0;
Y26=0;
Y27=0;
Y31=1/(0.2i+0.074i);
Y32=0;
Y33=(0.0972-
   0.0602i)+1/(0.2i+0.074i)+1/(0.0134+0.0448i)+(1/(0.0044+0.0148i)+1/(0.0
   044+0.0148i))+1/(0.0067 +
   0.0224i)+0.1054i/2+0.1054i/2+0.3188/2+0.3188/2;
Y34=0;
Y35=0;
Y36=1/(0.0134+0.0448i);
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i));
Y41=0;
Y42=1/0.1i;
Y43=0;
Y44=(1/0.1i)+(0.1503-0.113i)+(1/(0.0541+0.0686i)+1/(0.25+0.6942i));
Y45=(1/(0.0541+0.0686i)+1/(0.25+0.6942i));
Y46=0;
Y47=0;
Y51=0;
Y52=0;
Y53=0;
Y54=(1/(0.0541+0.0686i)+1/(0.25+0.6942i));
Y55=(1/(0.0541+0.0686i)+1/(0.25+0.6942i))+(0.161-0.0998i)+1/0.4155i;
Y56=1/0.4155i;
Y57=0;
Y61=0;
Y62=0;
Y63=1/(0.0134+0.0448i);
Y64=0;
Y65=1/0.4155i;
Y66=1/(0.0134+0.0448i)+1/0.4155i+1/(0.0067 +
   0.0224i)+0.3188i/2+0.3188i/2;
Y67=0;
Y71=0;
Y72=0;
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i));
Y74=0;
Y75=0;
Y76=0;
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.422-
   0.261i)+0.1054i/2+0.1054i/2;
y11=Y11
y12=-(Y12)
```

```
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
   y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

2. Setelah Gangguan

```
Y11=1/(0.2i+0.074i);
Y12=0;
Y13=1/(0.2i+0.074i);
Y14=0;
Y15=0;
Y16=0;
Y17=0;
Y21=0;
Y22=1/0.133i;
Y23=0;
Y24=1/0.133i;
Y25=0;
Y26=0;
Y27=0;
Y31=1/(0.2i+0.074i);
Y32=0;
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+1/(0.0134+0.0448i)+(1/(0.0044+0.0148i)+1/(0.004
    4+0.0148i))+0.1054i/2+0.1054i/2+0.3188/2;
Y34=0;
Y35=0;
Y36=1/(0.0134+0.0448i);
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i));
Y41=0;
Y42=1/0.133i;
Y43=0;
Y44=(1/0.133i)+(0.148-0.092i)+(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y45=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y46=0;
Y47=0;
Y51=0;
Y52=0;
Y53=0;
Y54=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i));
Y55=(1/(0.3375+0.6549i)+1/(0.4196+0.6745i))+(0.164-0.102i)+1/0.4155i;
Y56=1/0.4155i;
Y57=0;
Y61=0;
Y62=0;
Y63=1/(0.0134+0.0448i);
Y64=0;
Y65=1/0.4155i;
Y66=1/(0.0134+0.0448i)+1/0.4155i+0.3188i/2;
Y67=0;
Y71=0;
Y72=0;
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i));
Y74=0;
Y75=0;
Y76=0;
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
    0.259i)+0.1054i/2+0.1054i/2;
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
```

```
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
    y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

Script Pembentukan dan Reduksi Matriks untuk Gangguan pada Saluran SL2

1. Selama Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+(1/(0.0
    044+0.0148i)+1/(0.0044+0.0148i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i
    /2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+1/(0.4196+0.6745i)+1/(0.169+0.327i)
Y45=1/(0.4196+0.6745i)
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=1/(0.4196+0.6745i)
Y55=1/(0.4196+0.6745i)+(0.164-0.102i)+1/0.4155i+1/(0.169+0.327i)
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y74=0
Y75=0
Y76=0
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
    0.259i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
```

```
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
    y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

2. Setelah Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+(1/(0.0
    044+0.0148i)+1/(0.0044+0.0148i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i
    /2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+1/(0.4196+0.6745i)
Y45=1/(0.4196+0.6745i)
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=1/(0.4196+0.6745i)
Y55=1/(0.4196+0.6745i)+(0.164-0.102i)+1/0.4155i
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y74=0
Y75=0
Y76=0
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
    0.259i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
```

```
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
   y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

Script Pembentukan dan Reduksi Matriks untuk Gangguan pada Saluran SL3

1. Selama Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+(1/(0.0
    044+0.0148i)+1/(0.0044+0.0148i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i
    /2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+1/(0.2098+0.3372i)+1/(0.3375+0.6549i)
Y45=1/(0.3375+0.6549i)
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=1/(0.3375+0.6549i)
Y55=1/(0.2098+0.3372i)+(0.164-0.102i)+1/0.4155i+1/(0.3375+0.6549i)
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y74=0
Y75=0
Y76=0
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
    0.259i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
```

```
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
    y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

2. Setelah Gangguan

```
Y11=1/(0.2i+0.074i)
Y12=0
Y13=1/(0.2i+0.074i)
Y14=0
Y15=0
Y16=0
Y17=0
Y21=0
Y22=1/0.133i
Y23=0
Y24=1/0.133i
Y25=0
Y26=0
Y27=0
Y31=1/(0.2i+0.074i)
Y32=0
Y33=(0.097-
    0.06i)+1/(0.2i+0.074i)+(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+(1/(0.0
    044+0.0148i)+1/(0.0044+0.0148i))+0.1054i/2+0.1054i/2+0.3188i/2+0.3188i
    /2
Y34=0
Y35=0
Y36=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y37=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y41=0
Y42=1/0.133i
Y43=0
Y44=(1/0.133i)+(0.148-0.092i)+1/(0.3375+0.6549i)
Y45=1/(0.3375+0.6549i)
Y46=0
Y47=0
Y51=0
Y52=0
Y53=0
Y54=1/(0.3375+0.6549i)
Y55=(0.164-0.102i)+1/0.4155i+1/(0.3375+0.6549i)
Y56=1/0.4155i
Y57=0
Y61=0
Y62=0
Y63=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))
Y64=0
Y65=1/0.4155i
Y66=(1/(0.0134+0.0448i)+1/(0.0134+0.0448i))+1/0.4155i+0.3188i/2+0.3188i/2
Y67=0
Y71=0
Y72=0
Y73=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))
Y74=0
Y75=0
Y76=0
Y77=(1/(0.0044+0.0148i)+1/(0.0044+0.0148i))+(0.418-
    0.259i)+0.1054i/2+0.1054i/2
y11=Y11
y12=-(Y12)
y13=-(Y13)
y14=-(Y14)
y15=-(Y15)
y16=-(Y16)
y17=-(Y17)
```

```
y21=-(Y21)
y22=(Y22)
y23=-(Y23)
y24=-(Y24)
y25=-(Y25)
y26=-(Y26)
y27=-(Y27)
y31=-(Y31)
y32=-(Y32)
y33=(Y33)
y34=-(Y34)
y35=-(Y35)
y36=-(Y36)
y37=-(Y37)
y41=-(Y41)
y42=-(Y42)
y43=-(Y43)
y44=(Y44)
y45=-(Y45)
y46=-(Y46)
y47=-(Y47)
y51=-(Y51)
y52=-(Y52)
y53=-(Y53)
y54=-(Y54)
y55=(Y55)
y56=-(Y56)
y57=-(Y57)
y61=-(Y61)
y62=-(Y62)
y63=-(Y63)
y64=-(Y64)
y65=-(Y65)
y66=(Y66)
y67=-(Y67)
y71=-(Y71)
y72=-(Y72)
y73=-(Y73)
y74=-(Y74)
y75=-(Y75)
y76=-(Y76)
y77=(Y77)
K=[y11 y12;y21 y22]
L=[y13 y14 y15 y16 y17;y23 y24 y25 y26 y27]
M=[y33 y34 y35 y36 y37;y43 y44 y45 y46 y47;y53 y54 y55 y56 y57;y63 y64
   y65 y66 y67;y73 y74 y75 y76 y77]
LT=[y31 y32;y41 y42;y51 y52;y61 y62;y71 y72]

Yred=K-L*inv(M)*LT
abs(Yred)
angle(Yred)*180/pi
```

LAMPIRAN I

Script untuk Membentuk Kurva Ayunan dan Waktu Pemutusan Kritis Jika Terjadi Gangguan Di Bus GI Pangkalpinang

1. Untuk Pemutusan Gangguan 0,114 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.114
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.1267 - 0.0317 * cos(83.036/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.8251 - 1.007  * cos(94.3164/180*pi-
x(1)))];
end


close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

2. Untuk Pemutusan Gangguan 0,115 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.115
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.1267 - 0.0317 * cos(83.036/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.8251 - 1.007  * cos(94.3164/180*pi-
x(1)))];
end


close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

Script Untuk Membentuk Kurva Ayunan dan Waktu Pemutusan kritis Jika Terjadi Gangguan 3 Fasa pada Salah Satu Saluran Transmisi yang Menghubungkan GI Air Anyir dan GI Pangkalpinang

1. Untuk Pemutusan Gangguan 0,204 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.204
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.135 - 0.024 * cos(82.9375/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.506 - 0.959  * cos(89.1145/180*pi-
x(1)))];
end


close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

2. Untuk Pemutusan Gangguan 0,205 Detik

```
 function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.205
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.135 - 0.024 * cos(82.9375/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.506 - 0.959  * cos(89.1145/180*pi-
x(1)))];
end

close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

Script Untuk Membentuk Kurva Ayunan dan Waktu Pemutusan kritis Jika Terjadi Gangguan 3 Fasa pada Salah Satu Saluran Transmisi yang Menghubungkan GI Air Anyir dan GI Sungailiat

1. Untuk Pemutusan Gangguan 0,188 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.188
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.0851 - 0.023 * cos(82.861/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.4901 - 0.863  * cos(88.088/180*pi-
x(1)))];
end


close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

2. Untuk Pemutusan Gangguan 0,189 Detik

```
 function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.189
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(1.0851 - 0.023 * cos(82.861/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.4901 - 0.863  * cos(88.088/180*pi-
x(1)))];
end


close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

Script Untuk Membentuk Kurva Ayunan dan Waktu Pemutusan kritis Jika Terjadi Gangguan 3 Fasa pada Saluran SL2

1. Untuk Pemutusan 0,554 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.554
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.56 - 0.273 * cos(83.2062/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.2681 - 0.737  * cos(93.5766/180*pi-
x(1)))];
end

close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

2. Untuk Pemutusan 0,555 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.555
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.56 - 0.273 * cos(83.2062/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.2681 - 0.737  * cos(93.5766/180*pi-
x(1)))];
end

close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

Script Untuk Membentuk Kurva Ayunan dan Waktu Pemutusan kritis Jika Terjadi Gangguan 3 Fasa pada Saluran SL3

1. Untuk Pemutusan 0,607 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.607
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.5421 - 0.306 * cos(77.0925/180*pi-
x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.3671 - 0.758  * cos(90.965/180*pi-
x(1)))];
end

close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial', t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```

2. Untuk Pemutusan 0,608 Detik

```
function xdot = persamaan_differensial(t,x)
t_pemutusan_gangguan = 0.608
if t < t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.5421 - 0.306 *
cos(77.0925/180*pi-x(1)))];
end
if t >= t_pemutusan_gangguan
    xdot = [x(2) ; (50*pi/8.062)*(0.3671 - 0.758  *
cos(90.965/180*pi-x(1)))];
end

close;clc;clear all
delta_awal = 46.058
nilai_awal = [delta_awal/180*pi ;  0]
t = [0:0.0001:8] ;
[t,delta_dan_omega] = ode45('persamaan_differensial',
t,nilai_awal);
subplot (2,1,1)
plot(t,(delta_dan_omega(:,1))*180/pi);legend 'Sudut Daya';grid on
title('Kurva Ayunan Sudut Daya')
xlabel('Waktu (detik)')
ylabel('Delta (derajat listrik)')
```