



Fig. 4.9. Reduced primary a.c. system for the South Island of New Zealand

4.13. REFERENCES

1. B. Stott, 1974. 'Review of load-flow calculation methods', *Proc. IEEE*, **62** (7), 916-929.
2. J. B. Ward and H. W. Hale, 1956. 'Digital computer solution of power-flow problems', *Trans. AIEE.*, **PAS-75**, 398-404.
3. H. E. Brown, G. K. Carter, H. H. Happ and C. E. Person, 1963. 'Power-flow solution by impedance matrix iterative method', *IEEE Trans.* **PAS-82**, 1-10.
4. J. E. Van Ness and J. H. Griffin, 1961. 'Elimination methods for load-flow studies', *Trans. AIEE.*, **PAS-80**, 299-304.
5. W. F. Tinney, C. E. Hart, 'Power flow solution by Newton's method', *IEEE Trans.*, **PAS-86** (11), 1449-1460.
6. E. C. Ogbuobiri, W. F. Tinney and J. W. Walker, 1970. 'Sparsity-directed decomposition for Gaussian elimination on matrices', *IEEE, Trans.*, **PAS-89** (1), 141-150.
7. B. Stott and E. Hobson, 1971. 'Solution of large power-system networks by ordered elimination: a comparison of ordering schemes'. *Proc IEE* **118** (1) 125-134

CASE STUDY NUMBER 2
 THE SLACK BUS IS 6 NUMBER OF BUSES 17
 MAXIMUM NUMBER OF ITERATIONS 10 NUMBER OF LINES 20
 POWER TOLERANCE .00100 NO OF TRANSFORMERS 6
 PRINTOUT INDICATOR 000000000

BUS - DATA

BUS	NAME	TYPE	VOLTS	LOAD MW	LOAD MVAR	GENERATION MW	GENERATION MVAR	MINIMUM MVAR	MAXIMUM MVAR	SHUNT SUSCEPTANCE
1	INV220	0	1.0000	20.00	51.00	0.00	0.00	0.00	0.00	0.000
2	ROX220	0	1.0000	15.00	60.00	0.00	0.00	0.00	0.00	0.000
3	MAN220	0	1.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.000
4	MAN220	0	1.0450	0.00	0.00	69.00	0.00	0.00	0.00	0.000
5	TIW220	0	1.0000	42.00	185.00	0.00	0.00	0.00	0.00	0.000
6	ROX220	0	1.0500	0.00	0.00	0.00	0.00	0.00	0.00	0.000
7	BEN220	0	1.0000	20.00	200.00	0.00	0.00	0.00	0.00	0.000
8	AVI220	0	1.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.000
9	AVI220	0	1.0000	0.00	0.00	20.00	0.00	0.00	0.00	0.000
10	OHAI	0	1.0500	0.00	0.00	35.00	0.00	0.00	0.00	0.000
11	LIV220	0	1.0000	10.00	60.00	0.00	0.00	0.00	0.00	0.000
12	ISL220	0	1.0000	20.00	300.00	0.00	0.00	0.00	0.00	0.000
13	GRM220	0	1.0000	10.00	60.00	0.00	0.00	0.00	0.00	0.000
14	TEK220	0	1.0500	0.00	0.00	15.00	0.00	0.00	0.00	0.000
15	TEK220	0	1.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.000
16	TEK220	0	1.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.000
17	TIW220	0	1.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.000

TRANSFORMER - DATA

BUS	NAME	BUS	NAME	RESISTANCE	REACTANCE	TAP	CODE
3	MAN220	4	MAN220	0.00060	0.01600	1.000	0
4	ROX220	6	ROX220	0.00200	0.04000	1.000	0
5	TIW220	11	OHAI	0.00400	0.03200	1.000	0
6	AVI220	10	AVI220	0.00150	0.04500	1.000	0
7	BEN220	18	BEA220	0.00150	0.03500	1.000	0
10	TEK220	15	TEK220	0.00300	0.05600	1.000	0
	HV		LV				

LINE - DATA

BUS	NAME	BUS	NAME	RESISTANCE	REACTANCE	SUSCEPTANCE
1	INV220	3	MAN220	0.01300	0.09000	0.25000
2	ROX220	3	MAN220	0.01300	0.09000	0.25000
3	MAN220	5	TIW220	0.01000	0.10000	0.29000
4	MAN220	5	TIW220	0.01000	0.10000	0.29000
5	TIW220	5	TIW220	0.00200	0.04000	0.04000
6	ROX220	2	ROX220	0.00200	0.04000	0.04000
7	BEN220	2	ROX220	0.01000	0.11000	0.17000
8	AVI220	17	TIW220	0.01600	0.14000	0.24000
9	AVI220	17	TIW220	0.01600	0.14000	0.24000
10	OHAI	12	ROX220	0.03000	0.14000	0.18000
11	OHAI	17	TIW220	0.00700	0.03000	0.07000
12	ISL220	7	BEN220	0.00700	0.03000	0.05000
13	GRM220	7	BEN220	0.00400	0.05000	0.02000
14	TEK220	9	AVI220	0.00400	0.03000	0.02000
15	TEK220	13	ISL220	0.03000	0.18000	0.35000
16	TEK220	13	ISL220	0.00200	0.04000	0.02000
17	TIW220	13	ISL220	0.00200	0.04000	0.02000
18	GRM220	13	ISL220	0.00200	0.04000	0.02000
19	TEK220	13	ISL220	0.00200	0.04000	0.02000
20	TIW220	13	ISL220	0.02000	0.14000	0.45000

SOLUTION CONVERGED IN 5 P-D AND 5 Q-V ITERATIONS

LOAD MW	LOAD MVAR	GENERATION MW	GENERATION MVAR	LOSSES MW	LOSSES MVAR	MISMATCH MW	MISMATCH MVAR	SHUNTS MVAR
2020.000	916.000	2113.710	1420.669	93.915	504.688	-0.205	-0.019	0.000

Bruce Mork

BUS	NAME	BUS DATA				GENERATION				LOAD				SHUNT	
		VOLTS	ANGLE	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MW	MVAR	MVAR	MVAR
1	INV220	0.936	-12.257	0.00	0.00	200.00	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	RUX220	0.982	-10.024	0.00	0.00	150.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00		
3	MAN220	1.002	-6.837	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
4	MAN014	1.045	0.119	690.00	288.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
5	TIW220	0.931	-16.527	0.00	0.00	420.00	185.00	0.00	0.00	0.00	0.00	0.00	0.00		
6	ROA011	1.050	0.000	723.71	242.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
7	BER220	0.993	-3.853	0.00	0.00	500.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00		
8	BER016	1.060	-3.999	0.00	223.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
9	AVI220	0.996	-3.278	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10	AVI011	1.045	-27.414	200.00	115.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
11	OMAU	1.050	-23.433	350.00	113.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
12	LIV220	0.966	-3.266	0.00	0.00	150.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00		
13	ISL220	1.000	-4.170	0.00	437.32	500.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00		
14	BHM220	0.994	-4.734	0.00	0.00	100.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00		
15	TER011	1.008	-20.722	150.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
16	TER220	1.007	-31.466	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
17	TIW220	1.007	-31.265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

THE MAXIMUM MISMATCH IS 0.0861 ON BUS 3
 -5 SLACK BUS GENERATION IS 723.709 242.372

LINE AND TRANSFORMER DATA

BUS	NAME	MW	MVAR
3	MAN220	-17.878	-0.447
4	MAN220	4.233	3.888
5	TIW220	2.952	-0.807
6	ROA011	0.001	-0.004
MISMATCH			
17	TIW220	150.923	39.328
17	TIW220	184.156	-2.506
16	TER220	7.143	-1.853
16	OMAU	-7.087	-0.009
MISMATCH			
1	MAN220	179.544	49.242
1	MAN220	167.895	4.143
1	MAN014	-68.007	-20.766
MISMATCH			
3	MAN220	689.980	285.734
MISMATCH			
3	MAN220	-16.722	-9.833
3	MAN220	16.722	9.833
3	MAN220	-4.344	-0.529
MISMATCH			
2	ROA220	723.710	242.372
MISMATCH			
17	TIW220	-32.190	6.831
9	AVI220	-88.638	1.881
8	BER016	-8.297	-0.085
MISMATCH			
7	BER220	0.006	223.402
MISMATCH			
12	LIV220	21.370	97.623
6	ROA011	0.057	0.732
10	AVI011	-18.257	-9.700
MISMATCH			
5	AVI220	199.983	115.661
MISMATCH			
17	TIW220	350.004	113.378
MISMATCH			
3	ROA220	-226.600	75.096
9	AVI220	-39.708	-9.997
MISMATCH			
3	MAN220	91.982	-1.805
MISMATCH			
3	MAN220	-17.460	6.152
3	MAN220	-6.190	6.194
3	MAN220	-16.932	1.842
MISMATCH			
17	TIW220	-161.257	-1.977
MISMATCH			
16	TER220	149.983	-0.001
MISMATCH			
17	TIW220	-183.170	-18.863
MISMATCH			
3	ROA220	-17.298	3.170
3	ROA220	17.298	-3.170
3	ROA220	17.298	-3.170
3	ROA220	17.298	-3.170
MISMATCH			