

A Pool Strategy of Microgrid in Power Distribution Electricity Market – Data Set

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I. DATA OF NUMERICAL EXAMPLES FOR THE 33-NODE SYSTEM

Fig. 1 demonstrates the network of modified IEEE 33-node distribution system with three Microgrids and three distributed generators. The branch-feeder data are shown in Table I. The Table II shows the base load point data. The hourly load coefficients can be found in Table III. Table IV provides the distributed generators data in distribution system. Table V demonstrates the Microgrid information in distribution system. Table VI is data of distributed generators information for each Microgrid inside.

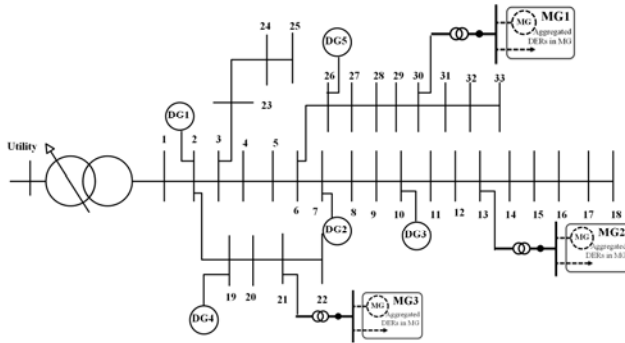


Figure. 1. Modified IEEE 33-node distribution system

TABLE I. BRANCH-FEEDER DATA

| Line No. | From Node | To Node | r(ohm) | x(ohm) |
|----------|-----------|---------|--------|--------|
| 1 | 1 | 2 | 0.0922 | 0.047 |
| 2 | 2 | 3 | 0.493 | 0.2511 |
| 3 | 3 | 4 | 0.366 | 0.1864 |
| 4 | 4 | 5 | 0.3811 | 0.1941 |
| 5 | 5 | 6 | 0.819 | 0.707 |
| 6 | 6 | 7 | 0.1872 | 0.6188 |
| 7 | 7 | 8 | 0.7114 | 0.2351 |
| 8 | 8 | 9 | 1.03 | 0.74 |
| 9 | 9 | 10 | 1.044 | 0.74 |
| 10 | 10 | 11 | 0.1966 | 0.066 |
| 11 | 11 | 12 | 0.3744 | 0.1238 |
| 12 | 12 | 13 | 1.468 | 1.155 |
| 13 | 13 | 14 | 0.5416 | 0.7129 |
| 14 | 14 | 15 | 0.591 | 0.526 |
| 15 | 15 | 16 | 0.7463 | 0.545 |
| 16 | 16 | 17 | 1.289 | 1.721 |
| 17 | 17 | 18 | 0.732 | 0.574 |
| 18 | 2 | 19 | 0.164 | 0.1565 |
| 19 | 19 | 20 | 1.5042 | 1.3554 |
| 20 | 20 | 21 | 0.4095 | 0.4784 |

| Line No. | From Node | To Node | r(ohm) | x(ohm) |
|----------|-----------|---------|--------|--------|
| 21 | 21 | 22 | 0.7089 | 0.9373 |
| 22 | 3 | 23 | 0.4512 | 0.3083 |
| 23 | 23 | 24 | 0.898 | 0.7091 |
| 24 | 24 | 25 | 0.896 | 0.7011 |
| 25 | 6 | 26 | 0.203 | 0.1034 |
| 26 | 26 | 27 | 0.2842 | 0.1447 |
| 27 | 27 | 28 | 1.059 | 0.9337 |
| 28 | 28 | 29 | 0.8042 | 0.7006 |
| 29 | 29 | 30 | 0.5075 | 0.2585 |
| 30 | 30 | 31 | 0.9744 | 0.963 |
| 31 | 31 | 32 | 0.3105 | 0.3619 |
| 32 | 32 | 33 | 0.341 | 0.5302 |

TABLE II. BASE LOAD DATA

| Node No. | P (kw) | Q (kvar) |
|----------|--------|----------|
| 2 | 100 | 60 |
| 3 | 90 | 40 |
| 4 | 120 | 80 |
| 5 | 60 | 30 |
| 6 | 60 | 20 |
| 7 | 200 | 100 |
| 8 | 200 | 100 |
| 9 | 60 | 20 |
| 10 | 60 | 20 |
| 11 | 45 | 30 |
| 12 | 60 | 35 |
| 13 | 60 | 35 |
| 14 | 120 | 80 |
| 15 | 60 | 10 |
| 16 | 60 | 20 |
| 17 | 60 | 20 |
| 18 | 90 | 40 |
| 19 | 90 | 40 |
| 20 | 90 | 40 |
| 21 | 90 | 40 |
| 22 | 90 | 40 |
| 23 | 90 | 50 |
| 24 | 420 | 200 |
| 25 | 420 | 200 |
| 26 | 60 | 25 |
| 27 | 60 | 25 |
| 28 | 60 | 20 |
| 29 | 120 | 70 |
| 30 | 200 | 600 |
| 31 | 150 | 70 |
| 32 | 210 | 100 |
| 33 | 60 | 40 |

TABLE III. HOURLY LOAD COEFFICIENTS

| Time | Coefficient |
|------|-------------|
| 1 | 0.5409 |
| 2 | 0.5291 |
| 3 | 0.5248 |
| 4 | 0.5595 |
| 5 | 0.5446 |
| 6 | 0.5458 |
| 7 | 0.6270 |
| 8 | 0.6772 |
| 9 | 0.6933 |
| 10 | 0.7299 |
| 11 | 0.7485 |
| 12 | 0.7515 |
| 13 | 0.8625 |
| 14 | 0.9461 |
| 15 | 0.9517 |
| 16 | 0.9721 |
| 17 | 0.9994 |
| 18 | 1.0000 |
| 19 | 0.9641 |
| 20 | 0.9610 |
| 21 | 0.8674 |
| 22 | 0.8073 |
| 23 | 0.6084 |
| 24 | 0.5855 |

TABLE IV. DISTRIBUTED GENERATOR DATA IN DS

| DG No. | Location (Node No.) | Max Active Output (p.u.) | Max Reactive Output (p.u.) | Cost Coefficient (\$/p.u.) |
|--------|---------------------|--------------------------|----------------------------|----------------------------|
| 1 | 2 | 0.06 | 0.04 | 0.04 |
| 2 | 7 | 0.06 | 0.04 | 0.04 |
| 3 | 10 | 0.08 | 0.06 | 0.03 |
| 4 | 19 | 0.06 | 0.04 | 0.04 |
| 5 | 26 | 0.04 | 0.03 | 0.05 |

TABLE V. MICROGRID DATA AT PCCS

| MG NO. | Location (Node No.) | Max/Min Active Power at PCC (p.u.) | Max/Min Reactive Power at PCC (p.u.) |
|--------|---------------------|------------------------------------|--------------------------------------|
| 1 | 30 | ± 0.04 | ± 0.05 |
| 2 | 13 | ± 0.07 | ± 0.05 |
| 3 | 21 | ± 0.05 | ± 0.05 |

TABLE VI. DISTRIBUTED GENERATOR DATA IN MGS

| MG No. | DG No. | Max Active Output (p.u.) | Max Reactive Output (p.u.) | Cost Coefficient (\$/p.u.) | Active Loads (p.u.) | Reactive Loads (p.u.) |
|--------|--------|--------------------------|----------------------------|----------------------------|---------------------|-----------------------|
| 1 | 1 | 0.06 | 0.04 | 0.04 | 0.12 | 0.072 |
| | 2 | 0.04 | 0.03 | 0.05 | | |
| | 3 | 0.04 | 0.03 | 0.05 | | |
| 2 | 1 | 0.04 | 0.03 | 0.05 | 0.09 | 0.06 |
| | 2 | 0.04 | 0.03 | 0.05 | | |
| | 3 | 0.04 | 0.03 | 0.05 | | |
| 3 | 1 | 0.06 | 0.04 | 0.03 | 0.072 | 0.048 |
| | 2 | 0.04 | 0.03 | 0.05 | | |