APPENDIX 1

THE IEEE 30 BUS TEST SYSTEM DATA

The generation cost functions, shunt data, load and bus voltage limit data, and branch data of the standard IEEE 30 bus test system are given in Table A 1.1, Table A 1.2, Table A 1.3, and Table A 1.4, respectively.

Table A 1.1 Generation cost functions of the standard IEEE 30 bus system

<table>
<thead>
<tr>
<th>Bus No</th>
<th>Real Generation</th>
<th>Reactive Generation</th>
<th>Cost Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min (MW)</td>
<td>Max (MVAr)</td>
<td>Min (MW)</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>200</td>
<td>-20</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>80</td>
<td>-20</td>
</tr>
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</tr>
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Table A 1.2 Shunt data of the standard IEEE 30 bus system

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Table A.1.3 Load data and bus voltage limit data of the standard IEEE 30 bus system

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<td>$Q_D$ (MVAR)</td>
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<td>0.00</td>
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Table A.1.4 Line and transformer data of the standard IEEE 30 bus system

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<th>R (p.u.)</th>
<th>X (p.u.)</th>
<th>B (p.u.)</th>
<th>Rating (MVA)</th>
<th>Tap limits</th>
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<td>R (p.u.)</td>
<td>X (p.u.)</td>
<td>B (p.u.)</td>
<td>Rating (MVA)</td>
<td>Tap limits</td>
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APPENDIX 2

THE IEEE 14 BUS TEST SYSTEM DATA

The generation cost functions, shunt data, load and bus voltage limit data, and branch data of the standard IEEE 14 bus test system are given in Table A 2.1, Table A 2.2, Table A 2.3, and Table A 2.4, respectively.

Table A 2.1  Generation cost functions of the standard IEEE 14 bus system

<table>
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<tr>
<th>Bus No</th>
<th>Real Generation</th>
<th>Reactive Generation</th>
<th>Cost Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min (MW)</td>
<td>Max (MW)</td>
<td>Min (MVAr)</td>
</tr>
<tr>
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<td>200</td>
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</tr>
<tr>
<td>2</td>
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</tr>
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Table A.2.2 Load data and bus voltage limit data of the standard IEEE 14 bus system

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<td>(MW)</td>
<td>(MVAr)</td>
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Table A.2.3 Line and transformer data of the standard IEEE 14 bus system

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<th>X (p.u.)</th>
<th>B (p.u.)</th>
<th>Tap limits</th>
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<th>B (p.u.)</th>
<th>Tap limits</th>
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<td>0.22092</td>
<td>0.19988</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>20</td>
<td>13</td>
<td>14</td>
<td>0.17093</td>
<td>0.34802</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>

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**Figure A 2.1** Single line diagram of the IEEE 14 Bus Test System