# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## UNIT – III

GAUSS SEIDAL METHOD

# Algorithm

***Step 1:***

Assume a flat voltage profile 1+j0 for all buses except slack bus

***Step 2:***

Assume a suitable value of convergence criterion ε

***Step 3:***

Set iteration count k=0 and assume $V_1^0$ $V_2^0$ $V_3^0$ ……… $V_n^0$ except slack bus.

***Step 4:***

Set bus count p=1

***Step 5:***

Check for slack bus. If it is slack bus then go to step-12, otherwise go to next step.

***Step 6:*** Check for generator bus. If it is generator bus go to next step, otherwise go to step 9

***Step 7:***

Set $|V_p^k| = |V_p|_{spec}$ calculate the reactive power by,

$$Q_{p,cal}^{k+1} = (-1)\ \text{im}\{(V_P^k)^* \times [\sum_{q=1}^{p-1} Y_{pq} V_q^{k+1} + \sum_{q=p}^{n} Y_{pq} v_q^k]\}$$

If the calculated reactive power is within specified limits then consider this bus as generator bus and set $Q_P = Q_{p,cal}^{k+1}$ and go to next step.

If calculated Q violates the specified limit then treat this bus as load bus

$$\text{if } Q_{p,cal}^{k+1} < Q_{p,min} \text{ then } Q_p = Q_{p,min}$$
$$Q_{p,cal}^{k+1} > Q_{p,max} \text{ then } Q_p = Q_{p,max}$$

go to step-9

***Step 8:***

For generator bus the voltage magnitude is constant. The phase of bus voltage calculated by,

$$V_{p,temp}^{k+1} \frac{1}{Y_{pp}}\left[\frac{P_{p-Q_p}}{(V_p^k)^*} - \sum_{q=1}^{p-1} Y_{pq} V_q^{k+1} - \sum_{q=p+1}^{n} Y_{pq} v_q^k\right]$$

**Step 9:** For the load bus the value of voltage can be calculated by,

$$V_p^{k+1} = \frac{1}{Y_{pp}}\left[\frac{P_p - Q_p}{(V_p^k)^*} - \sum_{q=1}^{p-1} Y_{pq} V_q^{k+1} - \sum_{q=p+1}^{n} Y_{pq} v_q^k\right]$$

**Step 10:** An acceleration factor α can be used for faster convergence.

$$V_{p,acc}^{k+1} = V_p^k + \alpha(V_p^{k+1} - V_p^k)$$

Then set,

$$V_p^{k+1} = V_{p,acc}^{k+1} \qquad \alpha = 1.6$$

**Step 11:**

Calculate, $\Delta V_p^{k+1} = V_p^{k+1} - V_p^k$

**Step 12:**

Repeat steps 5 to 11 until all the bus voltages have been calculated . Continue until bus count is n.

**Step 13:**

Find the largest of the absolute value of change in voltage. $|\Delta V_{max}| < \varepsilon$ then move to next step. Otherwise increment the iteration count and go to step-4.

**Step-14**

Calculate the line flows and slack bus power using bus voltages.

# ASSESSMENT

1. In Gauss Seidel method of power flow problem , the number of iteration

a) Depends on number of busses
b) Depends on tolerance
c) Depends on voltage control busses
d) Remains fixed

# ASSESSMENT

2. List some disadvantages of G-S method

**Increases the number of iterations with increased number of buses.**

**Slow rate of convergence thus large number of iterations.**


thank you