Q6

To model the non-linearity, we can add a B(V) vector in our matrix equation. The B(V) vector models the non-linearity of the circuit: . The detail derivation is shown in the Appendix. In each of the time step, we can use a loop implementing the Newton Raphson method to solve the non-linear matrix equation. The non-linear matrix equation is shown as follow:

To solve the non-linear matrix equation, the following steps are performed in a loop until is less than the tolerance:

1. Construct the B(V) vector to model the non-linearity of the circuit
2. Compute
3. Compute the Jacobian matrix:
4. Calculate the H matrix:
5. Calculate
6. Update
7. Check whether the tolerance is met or not