**18-875/19-739 Homework 4**

**Engineering and Economics of Electric Power Systems**

Due on 02/25/2020 midnight (Canvas submission only) Student Name: Xi Chen

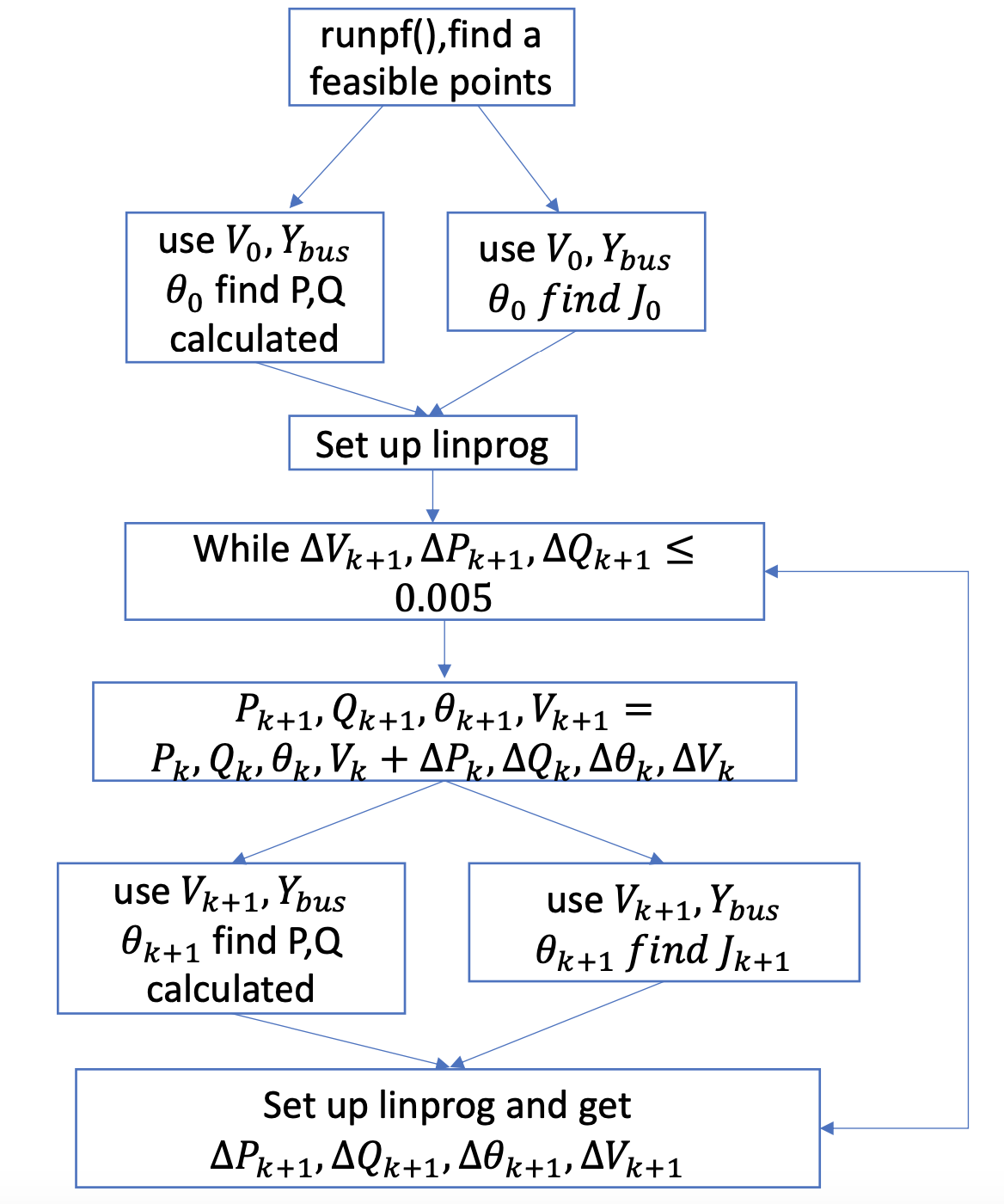
**Key Equation:**

**eq.5**

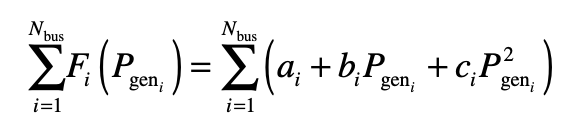
**eq.6**

Since the voltage and angle of the slack bus are constant so I set my lower bounds and upper bounds 0. Also, the voltage of the PV bus also constant, so I set the lower and upper bound of the voltage to zero.

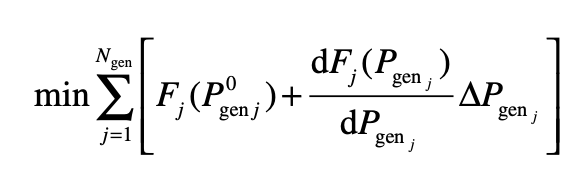
**Code Algorithm:**

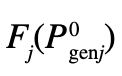
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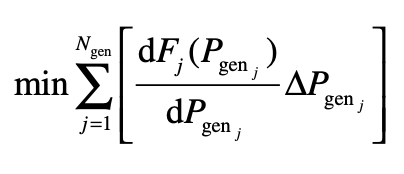
**Main Idea**

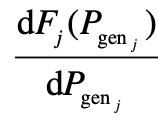
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Given a quadratic cost function, we can turn it into linear function by using

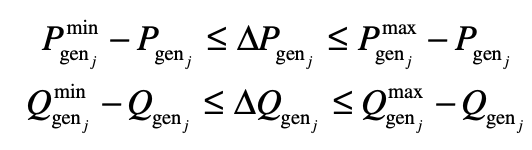


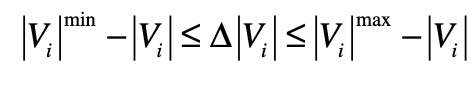
Since  is constant, we can ignore it in the objective function. So, the quadratic function is now in a linear form.



Which  is evaluated at Pgenj

Now, our objective function is related to the Next, we will turn **.**



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By doing that, each variable will be linear now.

**Result**

I cannot remember how many days I have devoted to this homework and I learn a lot from it, especially I get a deeper understanding of how the jacobian works and how to code the Ybus and nodal power flow equation which I have never done before. I also have learned how to manipulate the matrix in MATPOWER. However, I didn’t get a feasible result because my code gets into an infinite loop after the first iteration and I cannot find a way to solve it. After the first iteration, my generation 1 in case9 will drop to 0.1 pu which is the minimum output. It cannot be that small. I guess there may be something wrong with my jacobian but I cannot figure out where is wrong. Since it is close to 11:59 now so I decided to submit.