Himanshu Mishra 180293 Quiz 1 ME608N

Given $\varepsilon = 10^{-4}$.

Given the set of ~~linear~~ 6 equations. and the parameter to find are $P, \dot{m}, T_2, T_3, \dot{W_t}, \dot{W_c}, \dot{W_s}$

Now, Let $X = \begin{bmatrix} P \\ \dot{m} \\ T_2 \\ T_3 \\ \dot{W_t} \\ \dot{W_c} \\ \dot{W_s} \end{bmatrix}$. and eq^{n}s be:

$f_1(X) = 0$
$f_2(X) = 0$
$f_3(X) = 0$
$f_4(X) = 0$
$f_5(X) = 0$
$f_6(X) = 0$

Now, Let us take a value of X_0 (random guess).

Then construct the matrix J_0, which can be expressed as:

$$J = \begin{bmatrix} f_{1,1} & f_{1,2} & \cdots & f_{1,7} \\ f_{2,1} & f_{2,2} & \cdots & f_{2,7} \\ \vdots & & & \\ f_{6,1} & f_{6,2} & \cdots & f_{6,6} \end{bmatrix} \quad \text{where } f_{i,j} = \frac{\partial f_i}{\partial x_j}$$

also, Construct "f" as = $f = \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_6 \end{bmatrix}$ where $f_i = f_i(X_0)$

Now, ~~apply~~

apply the newton - Rapson method to form solution of system of non-linear equation ~~at~~ for each iteration.

$$x^{(k+1)} = x^{(k)} - (J^{-1}f)^{(k)} \quad \text{where } x = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}.$$

Stope iterating when $||LHS - RHS| < 10^{-4}$.

The final value of vector x^{k+1}, will give the value of the function.