The LTI model:

The objective function of MPC:

To make formulation easier, the LTI is rewritten in this form ():

So the general form of the model equation is:

Now building the derivative form of state space:

Variable definition:

Therefor the final form of model equation would be:

So the objective function would be:

The time steps are:

For , we initiate the dynamic time loop with: , and .

For :

Optimization problem formulation:

,

So the optimization problem has the following quadratic form: