**模型预测与控制**

1 线性模型预测控制很成熟

Linear Model Predictive Control [55] based Dynamic Matrix Control (DMC) algorithm has been successfully used in many industries because its capability to deal with constraints and a feedback control, as well as allow to use future setpoint in advance which is called a feed-forward control [56]. With the outstanding technique of the DMC algorithm, the future plant outputs are predicted by creating the outputs as a function of the plant inputs and disturbances

线性模型预测控制[55]基于动态矩阵控制（DMC）算法已经在许多行业得到成功使用，因为它有能力处理约束和反馈控制，以及允许使用预先将来设定值将其称为馈 前向控制[56]。 凭借DMC算法的杰出技术，未来输出可作为输入和扰动的函数进行预测

The linear MPC mainly refers to a linear prediction model and linear constraints. The  
algorithm consists of three major components: a multistep prediction, a state estimation,and a Quadratic Programming (QP). The multistep prediction is used for predicting the future plant outputs from influence of manipulated plant inputs, measured disturbances and unmeasured output disturbance. With the implementation of the DMC algorithm, the prediction model is assumed to be driven by step response models. The state estimation is used for estimating the future system states and improving disturbance estimation. The QP cost function is formulated to minimize the sum of squared deviations of the predicted plant outputs from the setpoint over the prediction horizon and the sum of squared changing rate of the plant control inputs over the control horizon by satisfying constraints. In the following subsections, the multistep output prediction, the state – space estimation, and the QP and constraints of the linear model predictive control [55] are introduced.

**线性MPC主要是指线性预测模型和线性约束。**该算法由三个主要部分组成：多步预测，状态估计和二次规划（QP）。多步预测用于根据受操纵的模型输入，测量的干扰和未测量的输出干扰的影响来预测未来的模型产出。随着DMC算法的实施，假定预测模型由阶跃响应模型驱动。状态估计用于估计未来系统状态并改善干扰估计。 QP成本函数被制定为通过满足约束来最小化预测模型输出与预测范围上的设定点的平方偏差的总和以及控制时域上的模型控制输入的平方变化率的总和。在下面的小节中，介绍了多步输出预测，状态空间估计以及线性模型预测控制的QP和约束[55]