CHAPTER VII

SUMMARY

7.1 Summary

1. Model predictive control system is able to control an exothermic reaction hydro-desulphurisation process both in normal and process constant mismatch. In case of disturbances of suplhur content in feed and weight hourly space velocity in reactor, the static linear sulphur content in product estimator, which model is periodically lab result updated by using Kalman filter to estimate the constant parameters is sufficient to estimate the sulphur content in product real-time without any physical sensors in the process. Furthermore, since model predictive and generic model controllers use process model for control calculation, Kalman filter could help to estimating the true or unknown states. In addition for model predictive controller, Kalman filter states estimation is also used for optimization for finding proper future manipulated variable trajectory. As a result, with well tuned, the model predictive controller give better and smoother control than generic model controller.

2. The model predictive control algorithm and generic model control algorithm can be compared as in table 6.1.

Table 7.1 Generic model and model predictive control algorithm comparison

	Item	Generic model controller	Model predictive controller
1.	Manipulated Variables	calculated directly from process model	calculated by objective function

2.	Tuning parameters	ξ and τ	weighting matrix Q and R, define manipulated variable N steps ahead
3.	Controller gain	constant	time vary changed, due to weight matrix P
4.	Manipulated Variable constraints	not in controller	can be included
5.	Number of Manipulated variables	only one	either one or multiple
6.	Number of Measured variables	either one of multiple	either one or multiple
7.	Calculation time	fast	slow
8.	Control application	can be process model change	can be both process model and objective function change

7.2 Recommendation

1. The sulphur prediction with lab update mechanism should further be developed to handle the lag time from sample taken, analyze and feedback the result.

2. The MATLAB programming code is still only demonstration model. It is not ready for being connected to the real process. It should be further developed for on-line application.