This thesis concerns robust control design. Two synthesis techniques, namely, H_∞ control and μ synthesis are presented. The objectives of the robust control design are to follow the desired reference input, reject disturbance noise, and guarantee stability and performance for systems subject to uncertain working conditions. Since the techniques analyze robust stability and robust performance in frequency domain, the performance weight which specifies system performance is a function in the frequency domain. Thus, it is rather difficult to directly select weighting functions to satisfy time domain specifications. One of the objectives of this thesis is to provide a guideline of selecting weighting functions satisfying for not only frequency-domain specifications but also some time-domain specifications in reference tracking problem. In particular, we specify performance in terms of bandwidth of closed-loop system, steady state error, and maximum control input signal.

The other objective is to apply the robust control design to a one-link flexible robot arm, which has parameter changes due to different working conditions. The simulation results show that this controller satisfies the design specifications. The experimental results clearly yield good time response and agree with the simulation results.

Department .Electrical..Engineering   **Student's signature** ..Laddawan..Soethow...
Field of study .Electrical..Engineering   **Advisor's signature** ...David..Banjerdpongchai...
Academic year ....2000.........   **Co-advisor's signature** ....