



Contents of lecture

- 1 Introduction & motivation
- 2 Models for linear time-invariant MIMO systems
 - 2.1 Transfer function matrices and frequency response matrices
 - 2.2 State space models
 - 2.2.1 Basics
 - 2.2.2 Changing the coordinate system
 - 2.2.3 Stability
 - 2.2.4 Controllability
 - 2.2.5 Observability
 - 2.2.6 Kalman decomposition
 - 2.2.7 Computing with state space models
 - 2.2.8 State space models from transfer function matrices
 - 2.3 Polynomial models
 - 2.3.1 Properties of polynomial matrices
 - 2.3.2 Polynomial matrix-fraction-descriptions
 - 2.4 Factorizations In RH_∞
- 3 Poles and zeroes
 - 3.1 Transfer poles and zeroes
 - 3.2 System poles and zeroes
- 4 Control synthesis in the time domain
 - 4.1 State feedback
 - 4.1.1 Pole placement
 - 4.1.2 Optimal control
 - 4.2 State estimation
 - 4.2.1 Observer
 - 4.2.2 Kalman filter

- 4.3 State estimation in the closed loop
- 5 Control synthesis in the frequency domain
 - 5.1 Closed loop stability
 - 5.1.1 Closed loop poles
 - 5.1.2 Graphical stability criteria
 - 5.1.3 Small gain theorem
 - 5.1.4 Stability with generalized diagonally dominant return difference matrix
 - 5.2 Quantitative closed loop properties
 - 5.2.1 SISO systems
 - 5.2.2 MIMO systems
 - 5.3 Robustness
 - 5.3.1 Unstructured multiplicative model uncertainty
 - 5.3.2 Unstructured factorized model uncertainty
 - 5.3.3 Structured additive model uncertainty
- 6 H_∞ control synthesis
 - 6.1 The H_∞ norm
 - 6.2 The mixed sensitivity problem
 - 6.3 Synthesis using normalized left-coprime factorizations