Session 4

Realizations from weighting patterns, impulse responses, and Markov parameters. Minimal Realizations

Reading Assignment

Rugh Ch 10, 11 (only pp194-199, skip proof of 11.7), (26: skip all proofs, scan definitions, examples and theorems, max 30min)

Exercise 4.1 = Rugh 10.2

Exercise 4.2 = Rugh 10.7

Exercise 4.3 = Rugh 10.9

Exercise 4.4 = Rugh 10.12

Exercise 4.5 = Rugh 26.5

Exercise 4.6 = Rugh 11.12

Exercise 4.7 Perform the calculations in Rugh Example 26.21 (p497) for $\alpha = -2, 0, 1$.

Exercise 4.8 = Rugh 26.7

Hand in problems

Exercise 4.9 The following system is given

$$\begin{aligned} \dot{x}_1 &= \sin(t)u(t) \\ \dot{x}_2 &= \cos(t)u(t) \\ y(t) &= \sin(t)x_1(t) + \cos(t)x_2(t) \end{aligned}$$

Calculate the weighting pattern, and show that it is stationary. Then give a time invariant realisation.

Exercise 4.10 Find a minimal realization of

$$G(s) = \begin{bmatrix} \frac{s+1}{s^2+2s+1} & \frac{s}{s^2+1} \\ \frac{1}{s+2} & \frac{2}{s^2+3s+2} \end{bmatrix}$$