Linear Systems Theory FRT001F 9p

Description

Mathematical theory for linear dynamical systems.

Topics covered

- Linear time-varying (LTV) systems.

- Linearisation.

- Coordinate transformation.

- Linear time-periodic (LTP) systems.

- Floquet-decomposition.

- Controllability and observability.

- Gramians.

- Controllable and observable form.

- Minimal realisation.

- Internal and Lyapunov stability.

- Input-output stability.

- Poles and zeros of MIMO systems.

- Smith-McMillan form.

- Polynomial fraction description.

- Adjoint systems

- Least squares

Main reference

W. J. Rugh, *Linear System Theory 2nd ed.*. Prentice Hall, 1996, ISBN 0-13-441205-2.

Additional references

- J. P. Hespanha, *Linear Systems Theory*. Princeton University Press. 2009. ISBN 9780691140216.

- D. Luenberger *Optimization by Vector Space Methods*. Wiley. 1998. ISBN 978-0-471-18117-0.

Assessment

- 8 hand-ins (best of 7). (35%)

- Take-home exam (24 hours) (60%).

- Participation in exercise sessions - present solutions to at least 5 questions in total during the course (5%).

Class schedule

- Week 42: Lecture 0+1 (Thursday); Exercise 0 (Friday).

- Week 43: Lecture 2 (Thursday); Exercise 1 (Friday).

- Week 44: Lecture 3 (Thursday); Exercise 2 (Friday).

- Week 45: Lecture 4 (Thursday); Exercise 3 (Friday).

- Week 46: Lecture 5 (Thursday); Exercise 4 (Friday).

- Week 47: Lecture 6 (Thursday); Exercise 5 (Friday).

- Week 48: Lecture 7 (Thursday); Exercise 6 (Friday).

- Week 49: Lecture 8 (Thursday); Exercise 7 (Friday).