UPPSALA UNIVERSITET

Intro. Computer Control Systems: F12

Summary

Dave Zachariah

Dept. Information Technology, Div. Systems and Control

dave.zachariah@it.uu.se

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What was this course about?

dave.zachariah@it.uu.se

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We want to control dynamical systems in a good way

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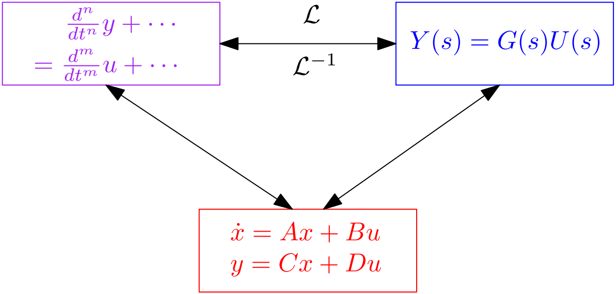
Systems: Linear time-invariant system models



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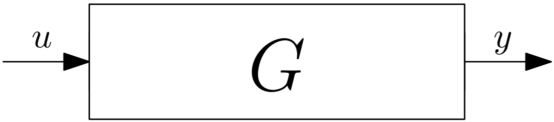

Complex-valued *transfer function* is compact but assumes initial values 0

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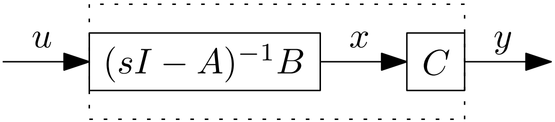

State-space description with matrices and arbitrary initial values

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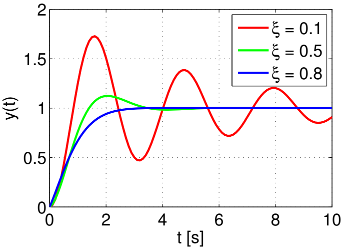
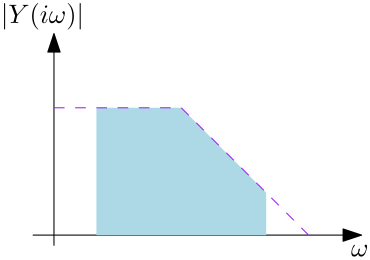
Systems: Linear time-invariant system models
Interpretations in *time*- and *frequency* domain





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Control: Feedback controllers to achieve $y(t) \approx r(t)$

- PID-controller
- State-feedback controller (with observer)

Closed-loop systems from $r(t)$ to $y(t)$

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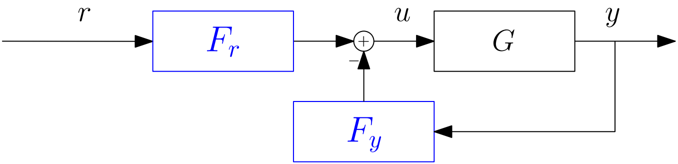

General structure for linear feedback (See F5+F10)

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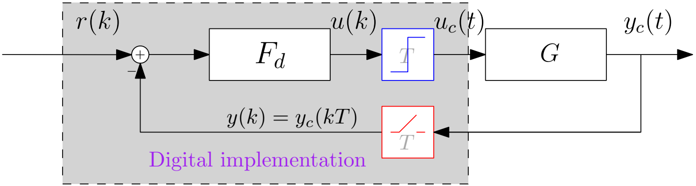

Discrete-time models for digital implementation

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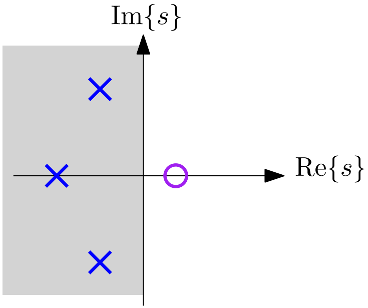
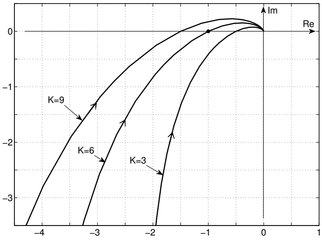
Good: Control criteria for closed-loop system

Stability





Methods: i) compute *poles*, ii) *Routh's algorithm*. Special cases iii) *root locus*, iv) *Nyquist curve* $G_0(i\omega)$

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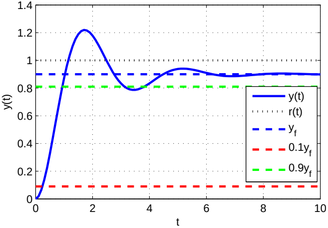
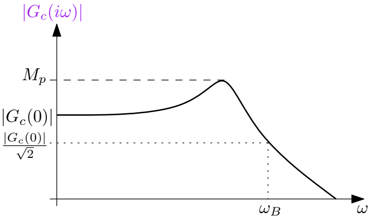
- Quickness
- Damping
- Accuracy





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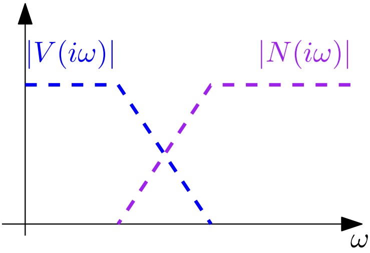
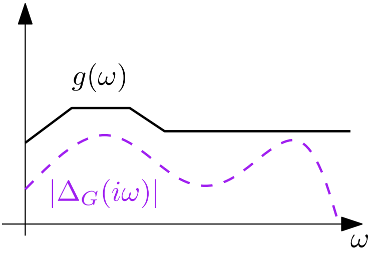
- Sensitivity towards disturbances and noise
- Robustness towards model errors





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Written exam

Individual estimate of attained knowledge goals

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Each problem solution evaluated using three criteria:

1. submitted solution
2. demonstrates understanding of problem
3. provides a reasonble and reproducible solution

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- Formula sheet: Key formulae handed out with exam. BETA and Pocket calculator allowed.
- Current idea: bonus points from assignments can eliminate half or the entire first problem.

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[Board: problems from exam]

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The future

Related courses:

- Empirisk modellering
- Automatic Control II: MIMO systems and optimal controllers
- Automatic Control III: nonlinear systems, limitations and trade-offs

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Good luck!

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