

# EE4109: Agenda (lecture 11)

## 1. Status of the design

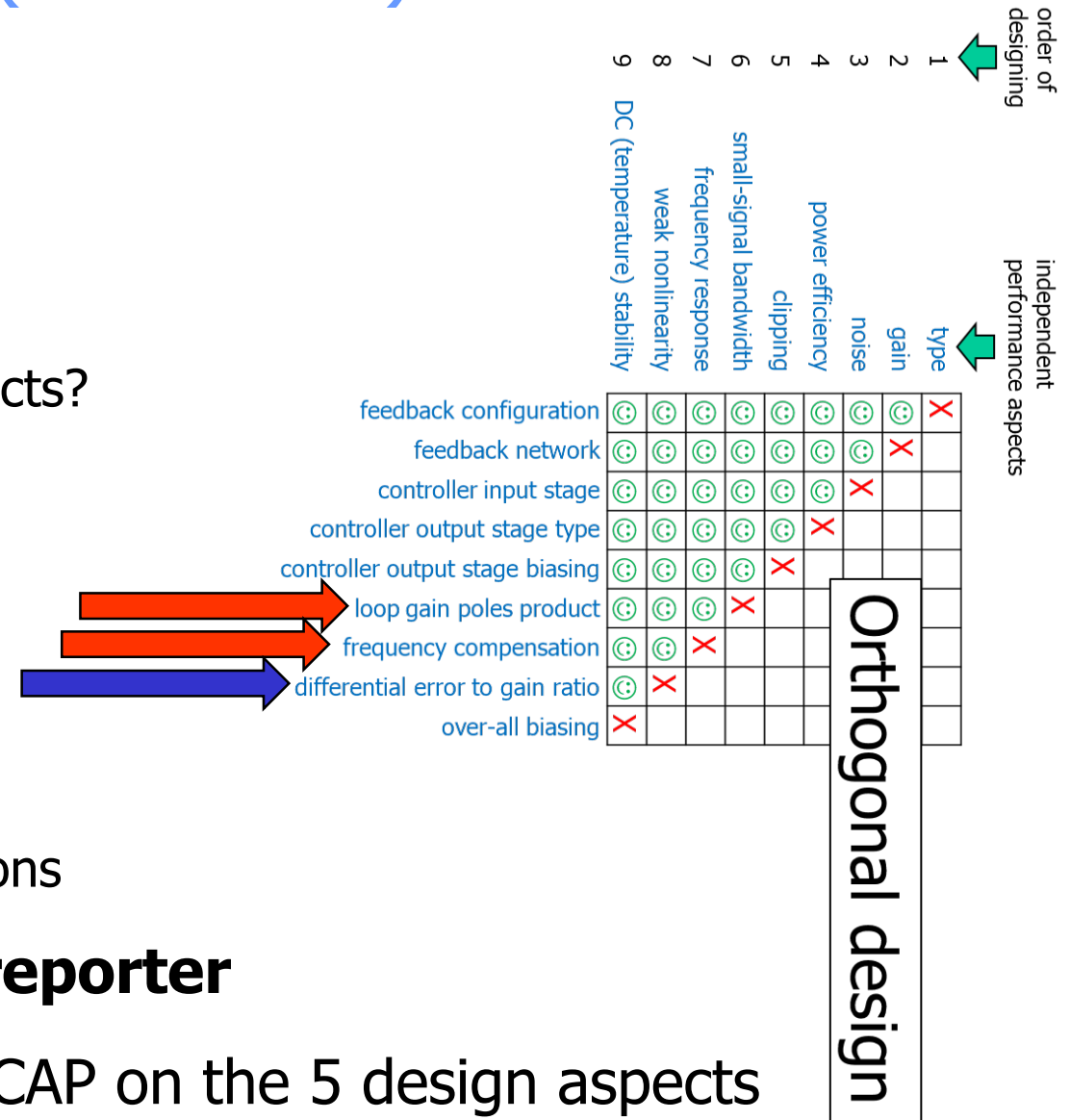
- What did we achieve so far?
- Impact of loop gain on what performance aspects?

## 2. 1<sup>st</sup> hour: Design teams at work

1. 5 design aspects: 5 teams
2. Appoint reporter
3. Work on design questions
4. Formulate design considerations and conclusions

## 3. 2<sup>nd</sup> hour: Reporting by design team reporter

4. Homework: create your own report in SLiCAP on the 5 design aspects



# Teamwork: Design considerations

Can the required performance be achieved with a **single-stage** amplifier?

Noise?

Drive capability?

Bandwidth?

Distortion?

Mid-band accuracy?

**Cost factors?**

What could a **two-stage architecture** look like?

Design considerations?

Tradeoffs between **performance aspects** and **cost factors?**

# Team 1, Single-stage feedback amplifier

## **Mid-band accuracy** with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Hand-calculation of the loop gain (parameter determination with LTSpice)

Verification by simulation (LTSpice or SLiCAP)

Discussion of results

3. Methods to improve

Give several methods to improve the mid-band accuracy

Discuss interaction with other performance aspects and cost factors

# Team 2, Single-stage feedback amplifier

## **Bandwidth** with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Hand-calculation of the bandwidth (parameter determination with LTSpice)

Verification by simulation (LTSpice or SLiCAP)

Discussion of results

3. Methods to improve

Can you think of reasons to modify the bandwidth?

Give several methods to modify the bandwidth

Discuss interaction with other performance aspects and cost factors

# Team 3, Single-stage feedback amplifier

## **Distortion** with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Check the distortion with LTSpice

Discussion of results

3. Methods to improve

Give several methods to improve the linearity

Discuss interaction with other performance aspects and cost factors

# Team 4, Single-stage feedback amplifier

## **Noise** with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Simulate noise performance of the output stage with LTSpice or SLiCAP

Discussion of results

3. Methods to improve

Can you think of reasons to modify the noise performance?

Give several methods to modify the noise performance

Discuss interaction with other performance aspects and cost factors

## Team 5, Two-stage feedback amplifier

# Topology generation two-stage amplifier

Propose different topologies

Generate different two-stage topologies for the signal path

Give design considerations:

- Type of input stage

- Type of output stage

- Relevant performance aspect of the stage

- Design parameters and cost factors

Rank the proposed solutions

- Criteria?

- Motivate the proposed order