Advanced Analogue Building Blocks

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Goals

- Get to know more advanced (analogue) circuits
- Understand their working principle. Be able to 'read' circuits.
- Be able to design, simulate and optimize circuits
- Learn how to chose good component sizes,…
- Predict and derive performance figures (speed, noise)
- Be able to study stability, PSRR, CMR, Noise,…

- Know typical solution for standard problems
  (ADC, DAC, PLL, LVDS, Filter,…)

- Prerequisites:
  - Mandatory: Components, Circuits & Simulation or similar
  - Cadence must be known!
  - Best, but not mandatory: VLSI Design or similar

- Reminder & Advanced Current Mirrors
- Voltage / Current References
- Amplifiers
  - Single stage (folded cascode,..)
  - Two Stage Amplifiers (-> stability)
  - Differential Amplifiers
- Comparators

- Switches, Charge Injection, Compensation, Gate Boosting
- Logic Families: CMOS, NMOS, Dynamic, Differential
- Transconductors
- Floating resistors

Possible Topics: Circuits

- Charge Amplifiers
- DACs
- ADCs
- Switched Capacitor Circuits
- PLL, DLL
- RAM/CAM

- gmC Filters, ICONs,...

Format of the Class

- There was too little active participation in exercises in last years!

- Structure (per topic):
  - Introductory Lecture & Demo
  - Definition of a project goal
  - Exercise sheet, guiding through design -> own work!
  - Chance for questions
  - Refinement / Optimisation of circuits
  - Presentation of results & discussion

- We will work on a common library
  - One category (~ subdirectory) per participant (and me)
  - Can open / discuss designs of everyone in the exercise
  - Can compare to what others do (and control…)

Caveat

- This lecture only makes sense if you invest a significant time in own work!