Lecture 25: Noise

• Announcements:
  • Project Slide Set #3 due Friday, April 26
  • HW#7 online and due Friday, 5/10, at 9 a.m.
  • Module 16 on Sensing Circuit Non-Idealities & Integration online
  • Module 17 is online (on Noise and MDS)
  • First 15 minutes of class were for HKN to go over course evaluation procedures

• Reading: Senturia Chpt. 14, 15
• Lecture Topics:
  • Ideal Op Amps
  • Op Amp Non-Idealities
  • MEMS-Transistor Integration
    — Mixed
    — MEMS-First
    — MEMS-Last
• Reading: Senturia Chpt. 16
• Lecture Topics:
  • Minimum Detectable Signal
  • Noise
    — Circuit Noise Calculations
    — Noise Sources
    — Equivalent Input-Referred Noise
  • Gyro MDS
    — Equivalent Noise Circuit
    — Example ARW Determination

• Last Time:
  • Going through MEMS/transistor integration …
Handling Noise Deterministically

\[ \frac{\Delta N}{\Delta f} = S(f) \rightarrow N_{\text{in}} = \sqrt{S(f)B} \]

Con consider this by a sinusoidal analysis step (e.g., when \( B \) is small, say 1 Hz)

Why is this the case?

What noise

\[ N(f) \]

Neither the amplitude nor the phase of a signal can change appreciably within a time period \( 1/B \).