ECE615 Mixed-Signal IC Design

Lecture 2 Slides: Quantizers

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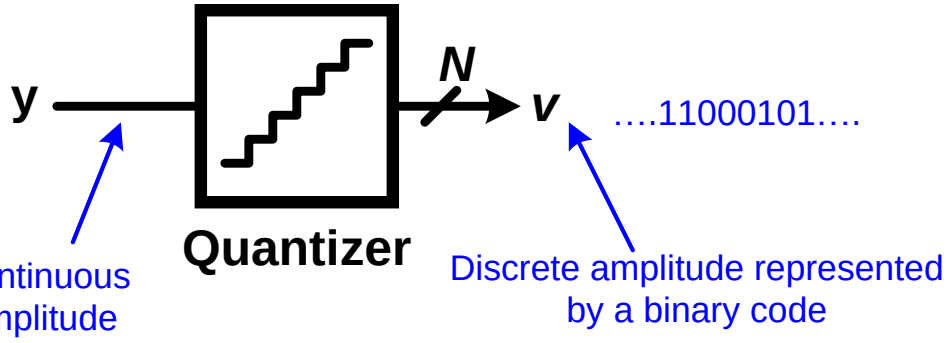
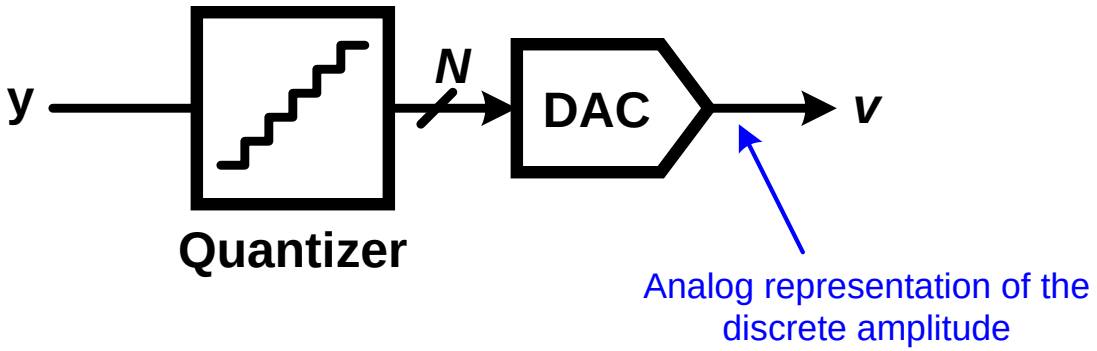
Quantizer



Modeling



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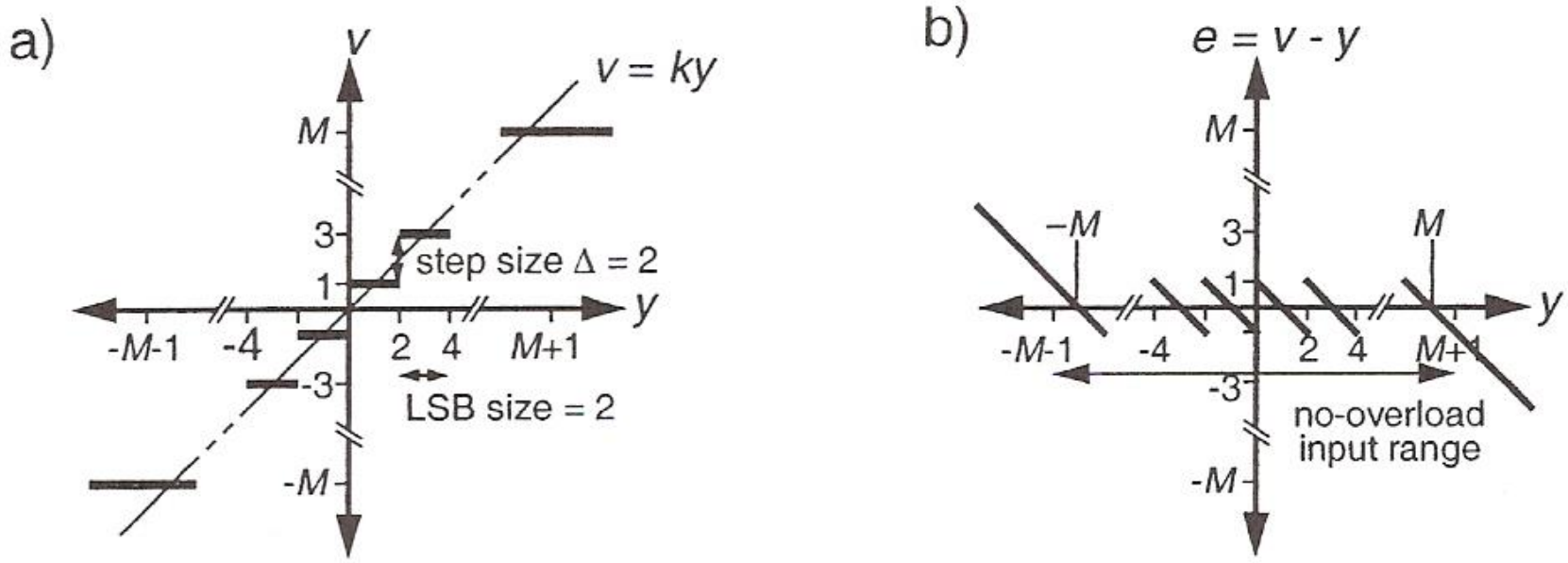
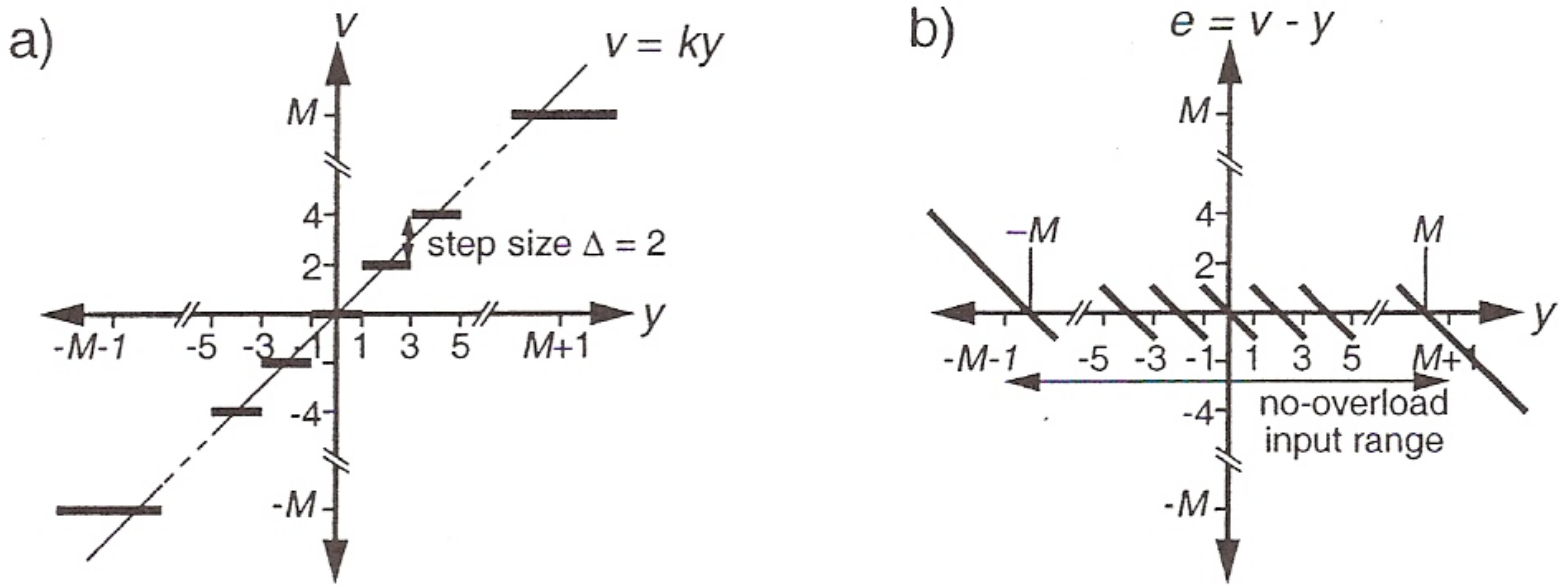
Mid-Rise Quantizer (even number of levels)



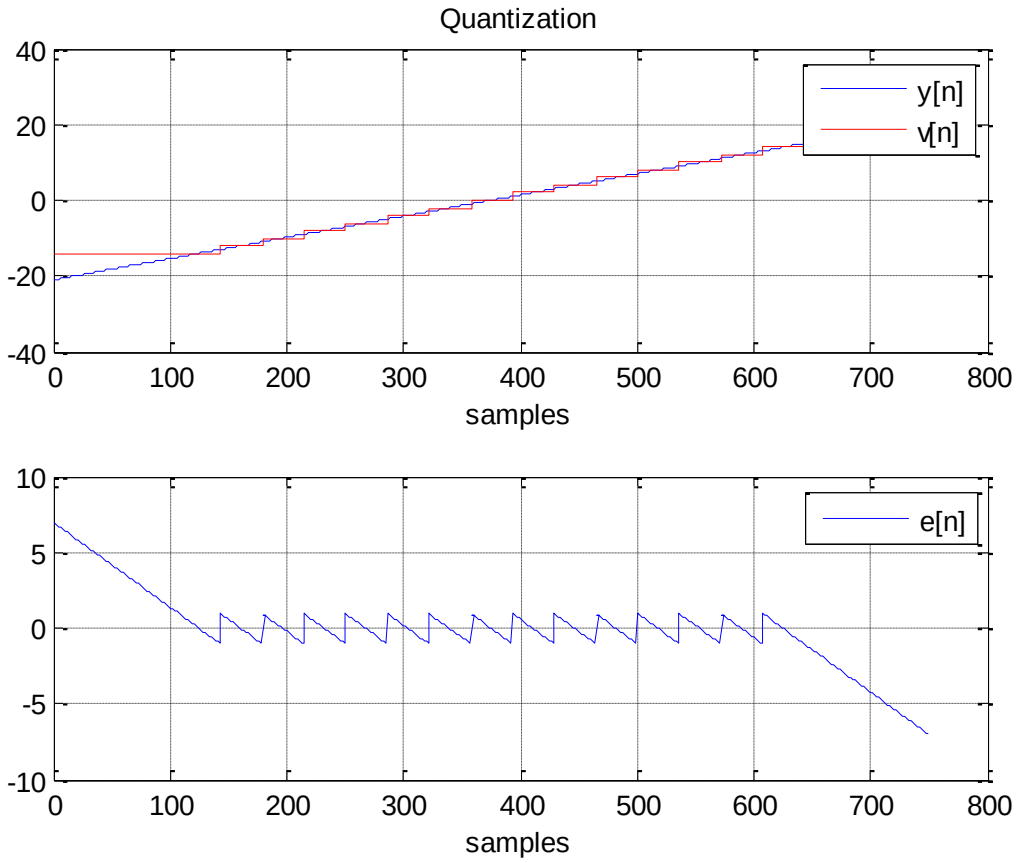
- Step rising at y=0 (mid-rise).
- In this figure (DSM toolbox model), LSB= Δ= 2
- M = Number of steps, (M is odd here)
  - Number of levels (nLev) = M+1, (even)
- Input thresholds: 0, ±2, ……, ±(M–1).
- Output levels: ±1, ±3, ……, ±M.

Mid-Tread Quantizer (odd number of levels)



- Flat part of the step at y=0 (mid-tread).
- Here, LSB= Δ= 2
- M = Number of steps, (M is even here)
  - ✓ Number of levels (nLev) = M+1, (odd)
- Input thresholds: 0, ±2, ……, ±(M–1).
- Output levels: 0, ±2, ±4, ……, ±M.

Quantizer characteristics : Slow ramp input



File: Quantizer_ramp_input.m

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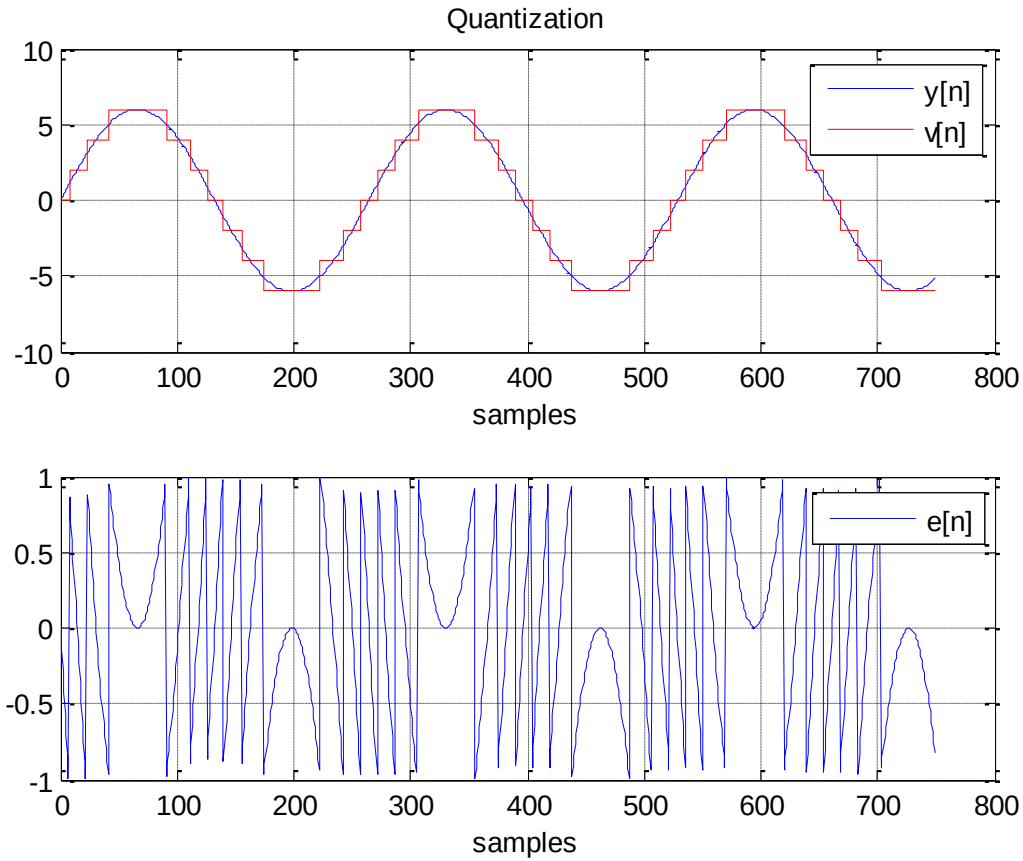
Quantizer characteristics : Sine input



File: Quantizer_sine_input.m

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