MATLAB Behavioural Documentation

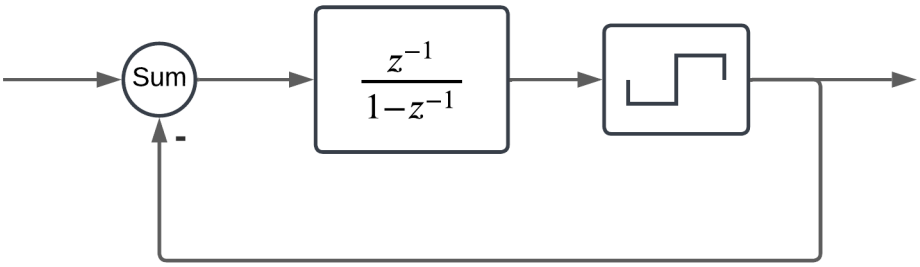

Figure 1: Blockdiagram of 1st order modulator

1st Order Modulator Model:

Comprised of:

- sum block (Δ):
  - one positive and one negativ input
  -
- discrete-time integrator as accumulator:
  - realised as: $\frac{z^{-1}}{1-z^{-1}}$
  -
- comparator (non-linear element):
  - switching threshold defined with 'eps' := 2^{-52} = 2.2204e-16
    - essentially switches around '0'-crossovers
  - output either '1' (on) or '-1' (off)

- feedback path from comparator output to sum block (neg. sign)

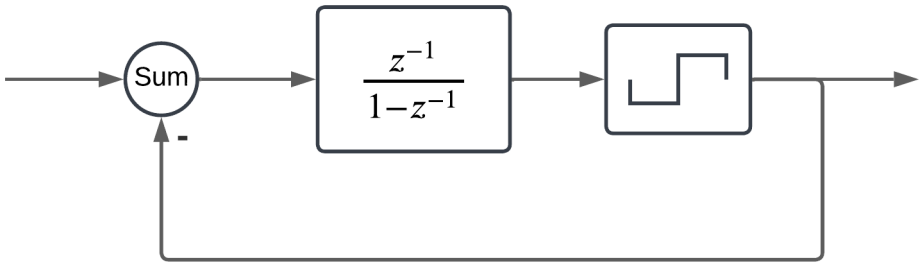

Figure 2: Behavioural Model of 1st Order Modulator

In-Depth description:

Input signal:

- Analog signal
  - Conveniently a sinusoid
    - Is non-linear, yet periodicly predictable

Delta (Δ):

- Feedback-node of the system

Integrator/ Loop Filter (Σ)

- Discrete-time implementation of integrator => accumulator
  - also represents a lowpass filter
  - Includes a delay of one time step.
- Serves as the "loop filter" of our system.
  - Accumulates difference ("error") between input and quantized feedback, including a sample delay.
  - Modeled, using the expression:

$$\frac{z^{-1}}{1-z^{-1}}$$

- System relevance: