Modified TLH

DSP First, 2/e

Lecture Chapter 5
FIR Filtering Intro
MOVING AVERAGE FILTER

PRESENTATION 1

Chapter 5 Website   FIR filters

Chapter 5: HW4 Lecture_5_1 Lecture5_2 ProblemSession1_Ch5

MATLAB_Ch5 Two_Interesting_FIR_Examples

Euler_Convolve_Review

The Running (Moving) Average Filter

- A three-sample *causal* moving average filter is a special case of (5.1)

$$y[n] = \frac{1}{3}(x[n] + x[n-1] + x[n-2]), \qquad (5.4)$$

which uses no future input values to compute the present output

From ECE 2601 Chapter 5
Causal is From The Past

GENERAL CAUSAL FIR FILTER

- FILTER COEFFICIENTS $\{b_k\}$
  - DEFINE THE FILTER

$$y[n] = \sum_{k=0}^{M} b_k x[n-k]$$

NOTE: Index k = 0, 1,2,…

- For example,

$$\boxed{b_k = \{3, -1, 2, 1\}}$$

$$y[n] = \sum_{k=0}^{3} b_k x[n-k]$$

DIFFERENCE EQUATION

$$= 3x[n] - x[n-1] + 2x[n-2] + x[n-3]$$

GENERAL CAUSAL FIR FILTER

- FILTER COEFFICIENTS $\{b_k\}$

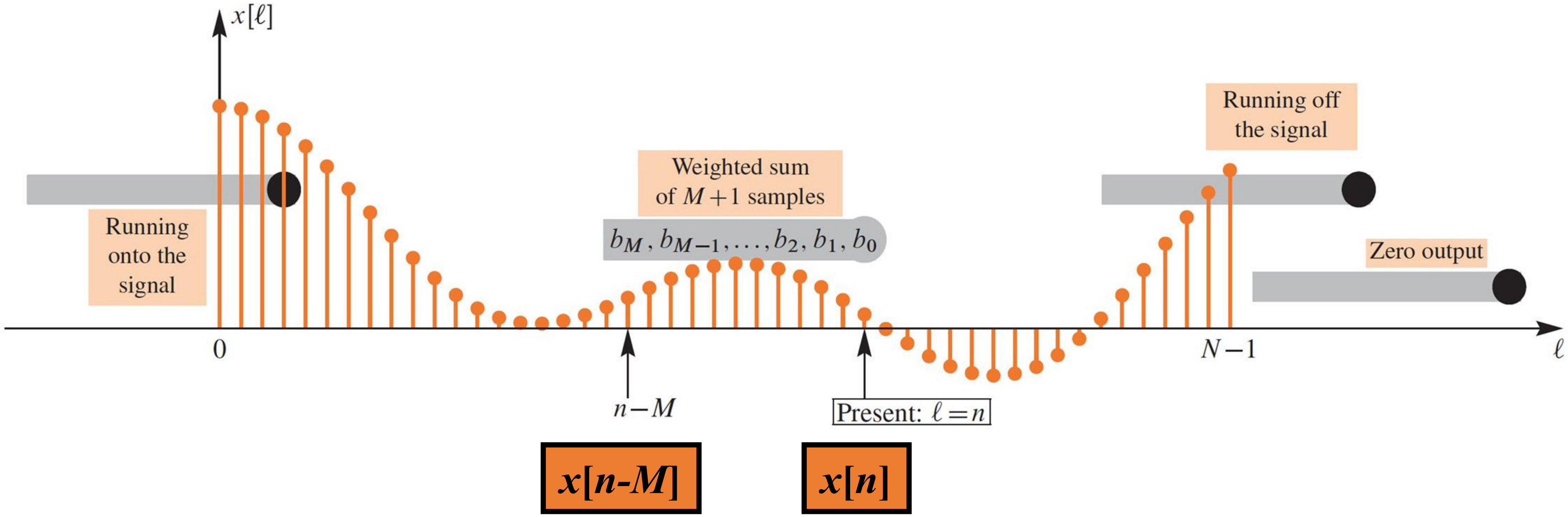
$$y[n] = \sum_{k=0}^{M} b_k x[n-k]$$

- FILTER **ORDER** is M
- FILTER **"LENGTH"** is L = M+1
  - NUMBER of FILTER COEFFS is L

GENERAL CAUSAL FIR FILTER

- SLIDE a WINDOW across x[n]

$$y[n] = \sum_{k=0}^{M} b_k x[n-k] = b_0 x[n] + b_1 x[n-1] + \cdots + b_M x[n-M]$$



FILTERED STOCK SIGNAL