

Anti-Image Postfilter (6B)

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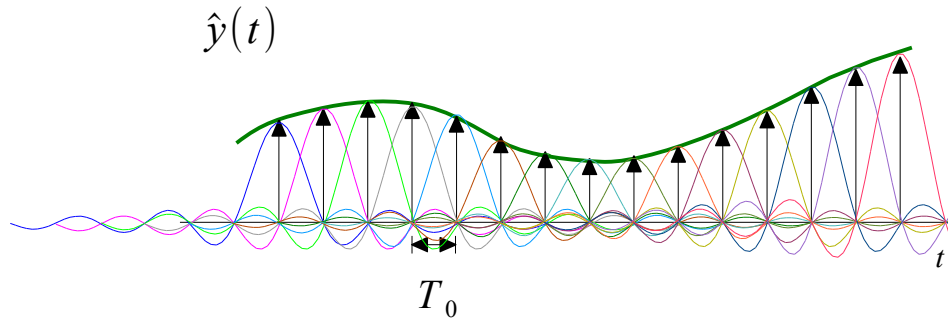
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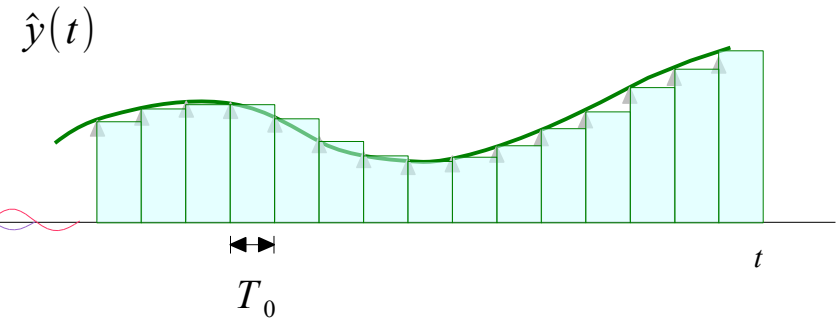
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Reconstructor

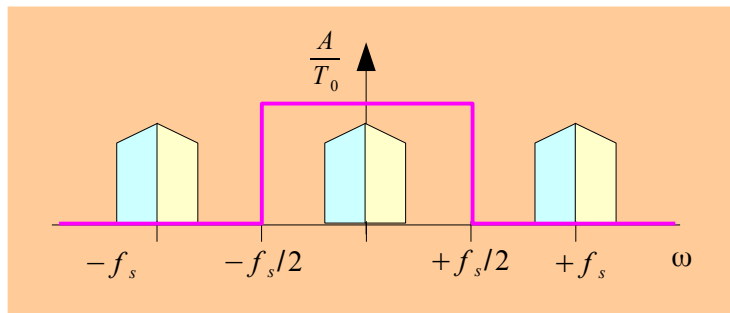
Ideal Reconstructor



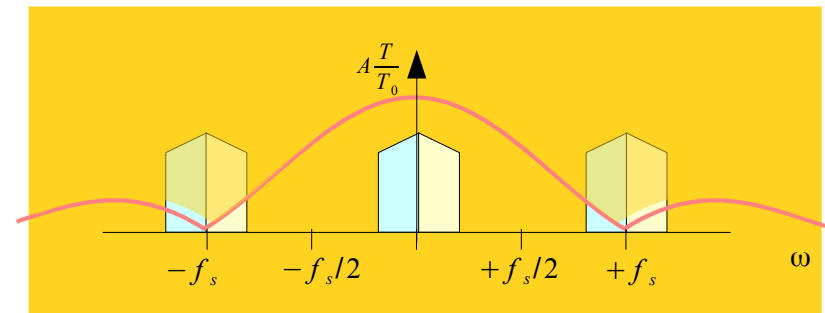
Practical Reconstructor



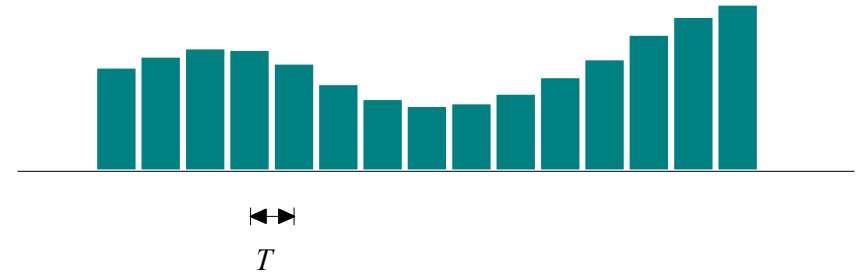
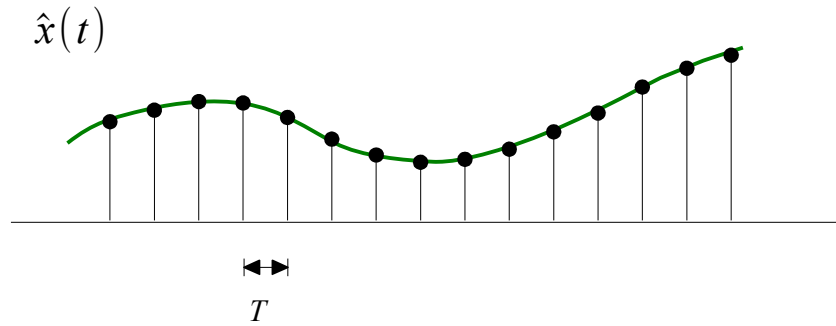
↓ CTFT



↓ CTFT



Analog Reconstructor



$$\hat{y}(t) = \sum_{n=-\infty}^{+\infty} y(nT) \delta(t-nT)$$

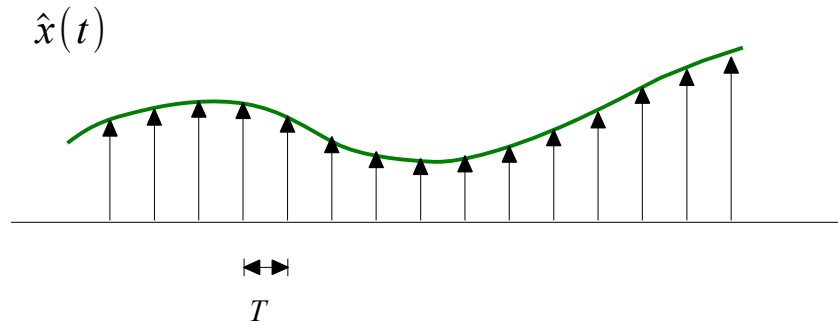
$$Y_a(f) = H(f) \hat{Y}(f)$$

$$y_a(t) = \int_{-\infty}^{+\infty} h(t-t') \hat{y}(t') dt'$$

$$\hat{Y}_a(f) = \frac{1}{T} \sum_{m=-\infty}^{+\infty} Y(f - m f_s)$$

$$y_a(t) = \sum_{n=-\infty}^{+\infty} y(nT) h(t-nT)$$

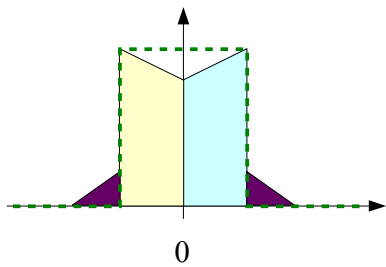
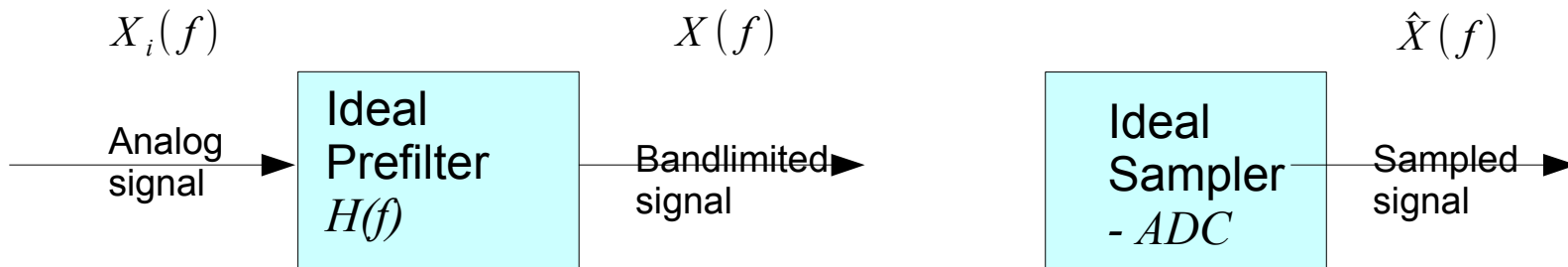
Impulse Response of Ideal Reconstructor



$$\hat{Y}(f) = \frac{1}{T} Y(f) \quad -\frac{f_s}{2} \leq f \leq +\frac{f_s}{2}$$

$$y(t) = \sum_{n=-\infty}^{+\infty} y(nT) h(t-nT)$$

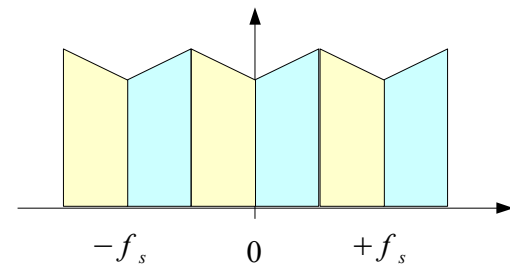
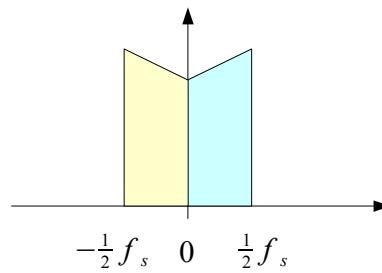
$$h(t) = \frac{\sin(\pi t/T)}{\pi t/T} = \frac{\sin(\pi f_s t)}{\pi f_s t}$$



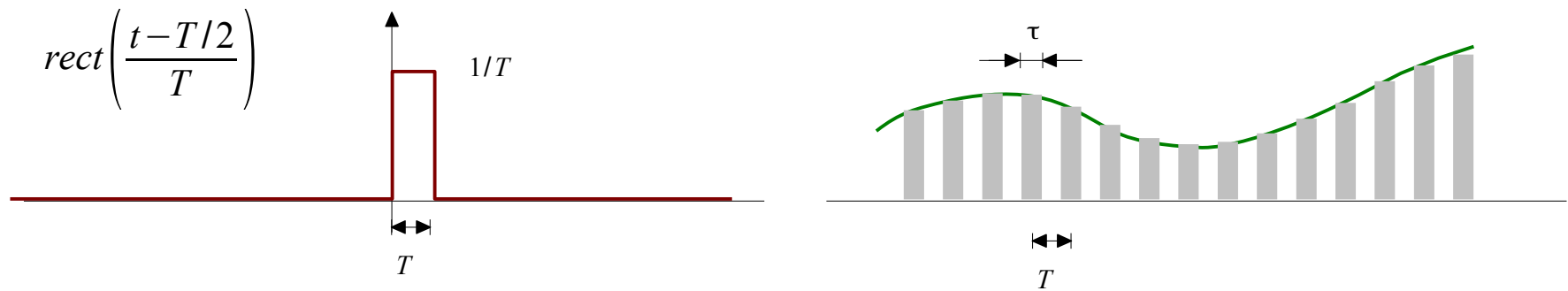
$$\frac{2}{4}f_s$$

$$\frac{3}{4}f_s$$

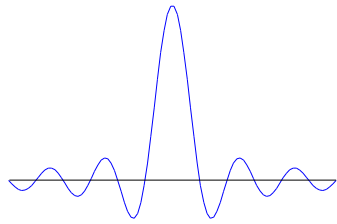
$$f_s$$

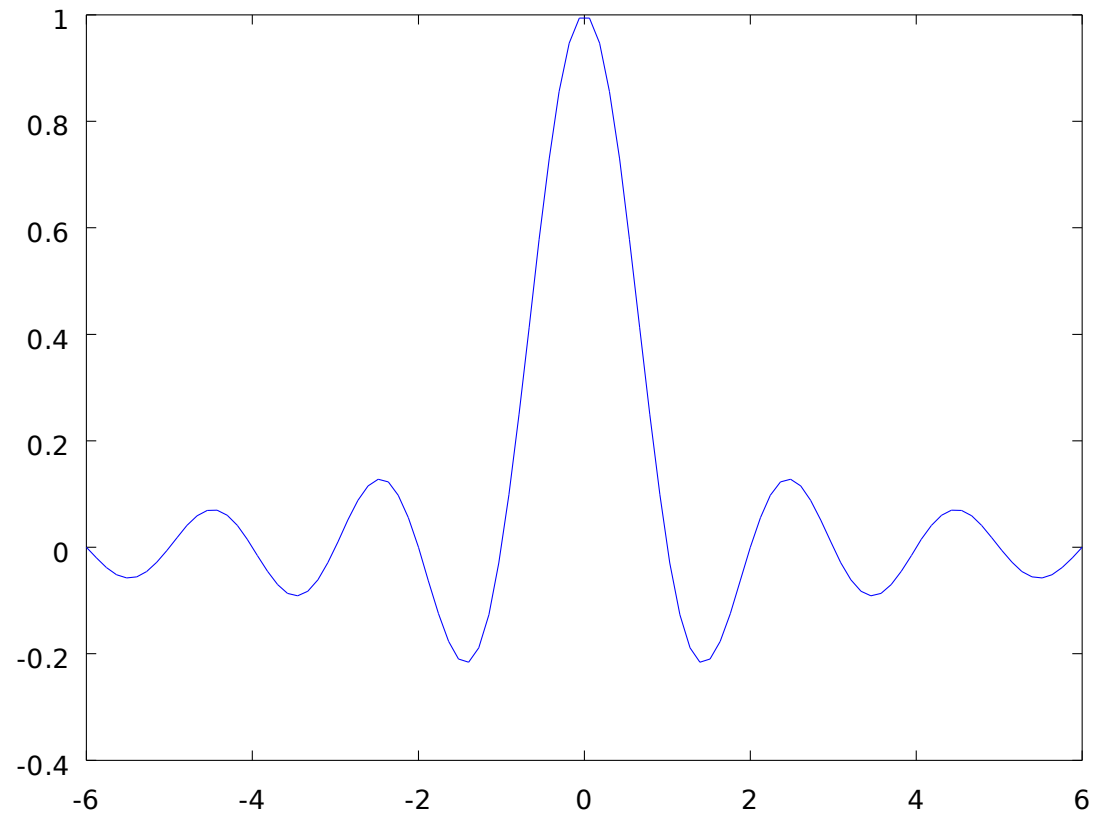


Zero Order Hold (ZOH)



$$x_{ZOH}(t) = \sum_{n=-\infty}^{+\infty} x[n] \cdot \text{rect}\left(\frac{t - T/2 - nT}{T}\right)$$





References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] A “graphical interpretation” of the DFT and FFT, by Steve Mann
- [4] R. G. Lyons, Understanding Digital Signal Processing, 1997
- [5] AVR121: Enhancing ADC resolution by oversampling
- [6] S.J. Orfanidis, Introduction to Signal Processing
www.ece.rutgers.edu/~orfanidi/intro2sp