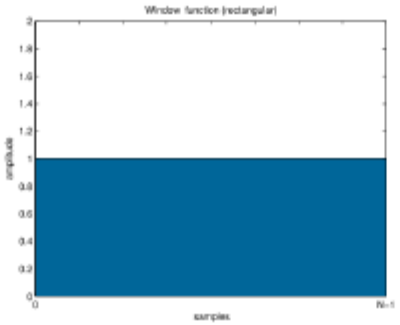
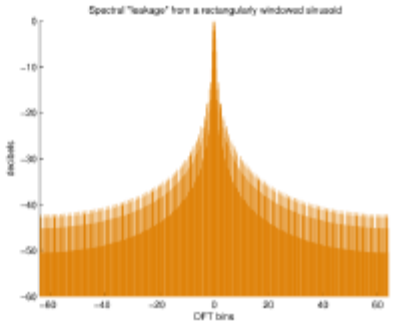
Time-varying vocal tract shape

Time-varying signal

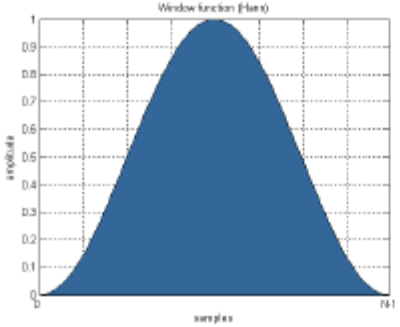
Analyze locally

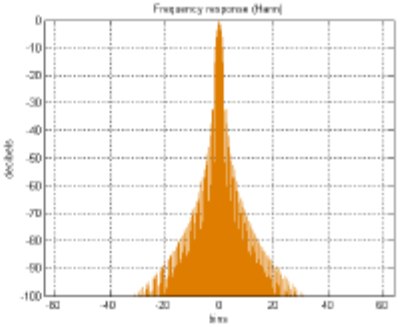
Rectangular



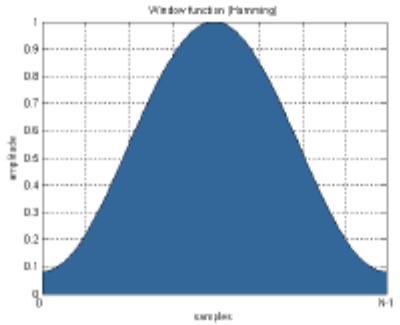


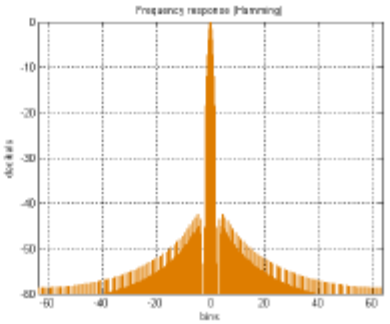
Hann

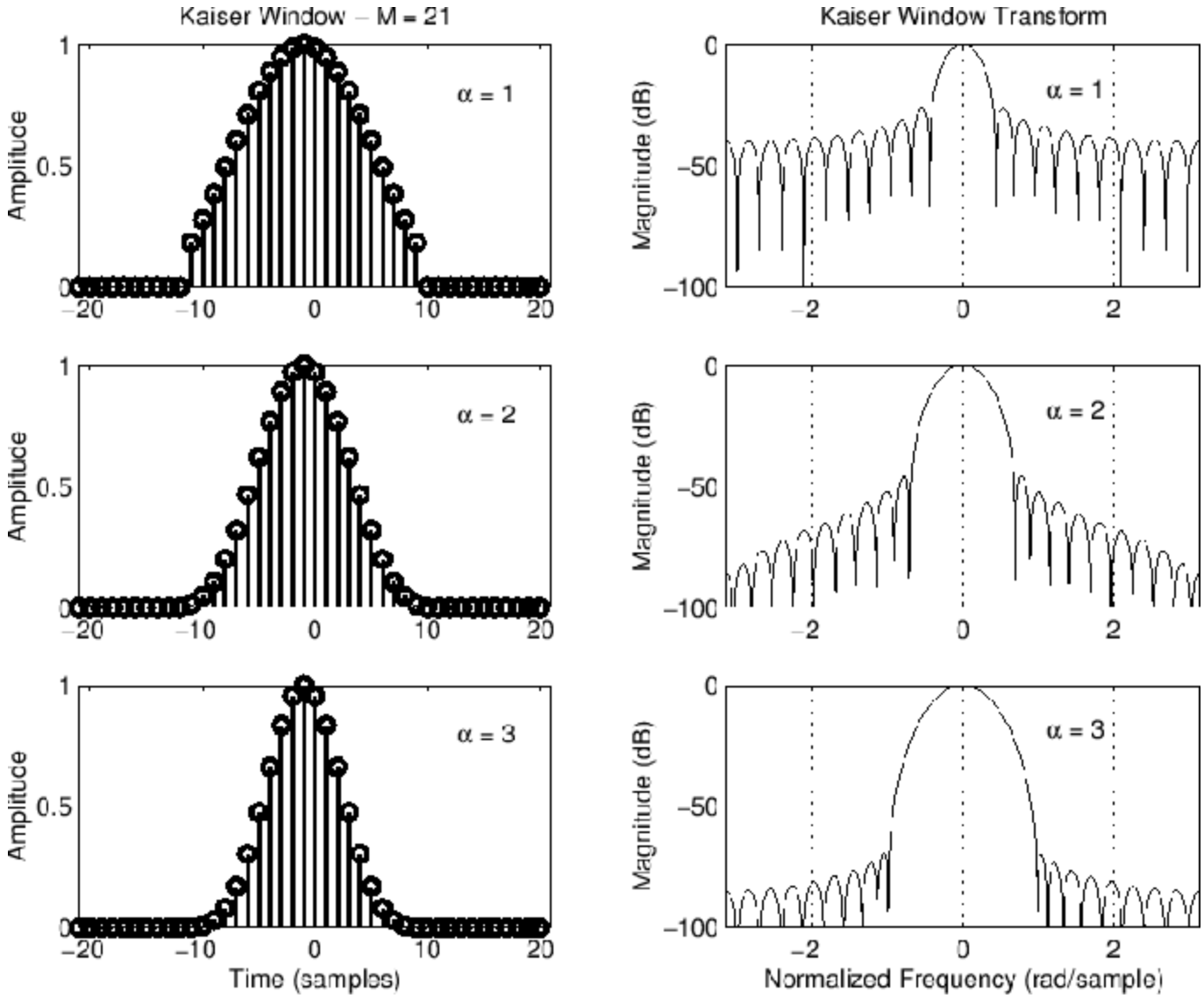




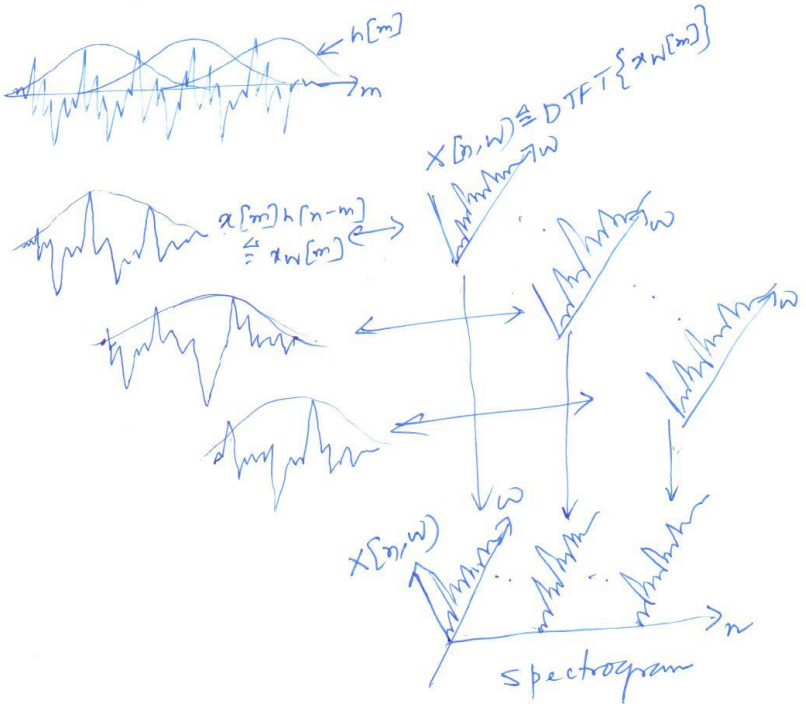
Hamming






Kaiser Window – M = 21
Kaiser Window Transform
Amplitude
Magnitude (dB)
α = 1
α = 2
α = 3
1
0.5
0
−20
−10
0
10
20
−50
−100
−2
2
Time (samples)
Normalized Frequency (rad/sample)

STFT



$$X[n,\omega] = \sum_{m=-\infty}^{\infty} x[m]\, h[n-m]\, e^{-j\omega m}$$

$$x[n] = \frac{1}{2\pi h[0]} \int_{-\pi}^{\pi} X[n,\omega]\, e^{j\omega n}\, d\omega$$

$$X[n,\omega) = \frac{1}{2\pi} \int_{-\pi}^{\pi} H(\theta)\, e^{j\theta n}\, X(\omega+\theta)\, d\theta.$$