Session4 Electronics1

Other concepts

Introduction – Text Books

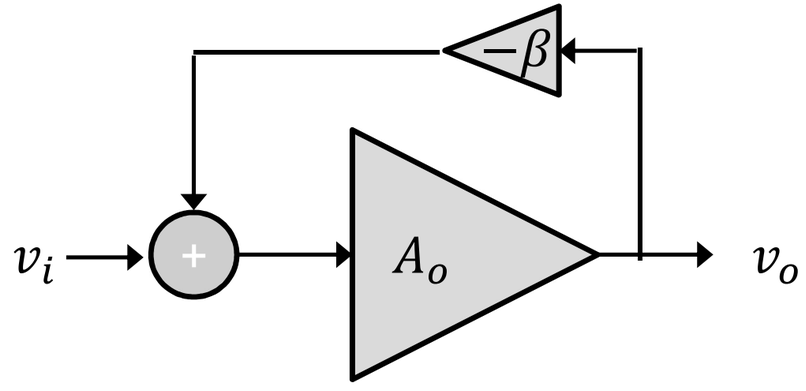
Feedback
Noise and signal to noise ratio
Signal bandwidth
Analog signal processing; amplification, filtering, modulation
Linear and nonlinear circuits

Feedback, negative vs. positive

Driving

Temperature Controller

Quizzes!

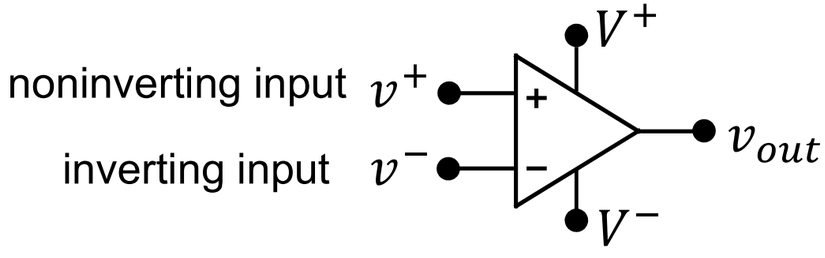


$$v_o = A_o v_i$$

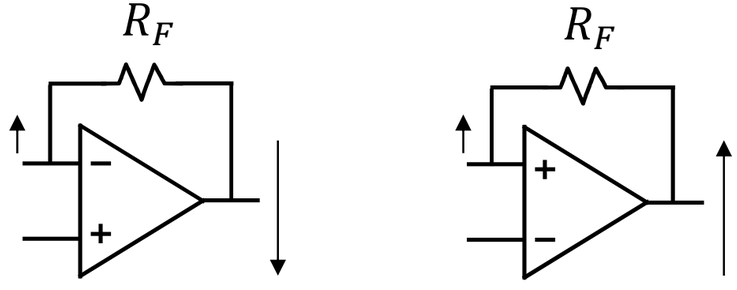
$$(v_i - \beta v_o)A_o = v_o$$

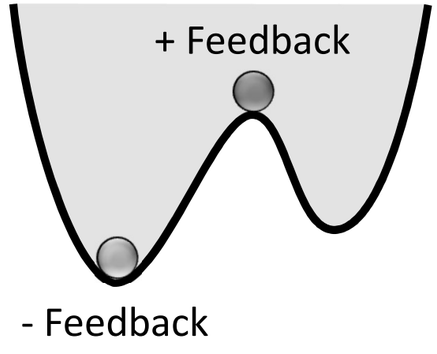
$$\frac{v_o}{v_i} = \frac{A_o}{1 + \beta A_o} \approx \frac{1}{\beta}$$

OP AMP is a differential amplifier

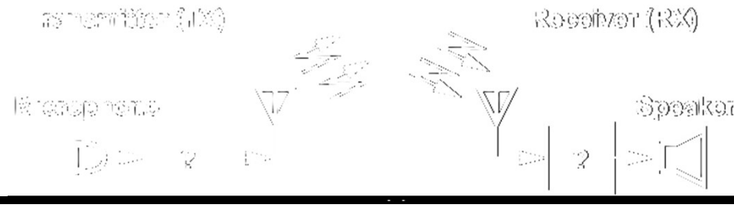


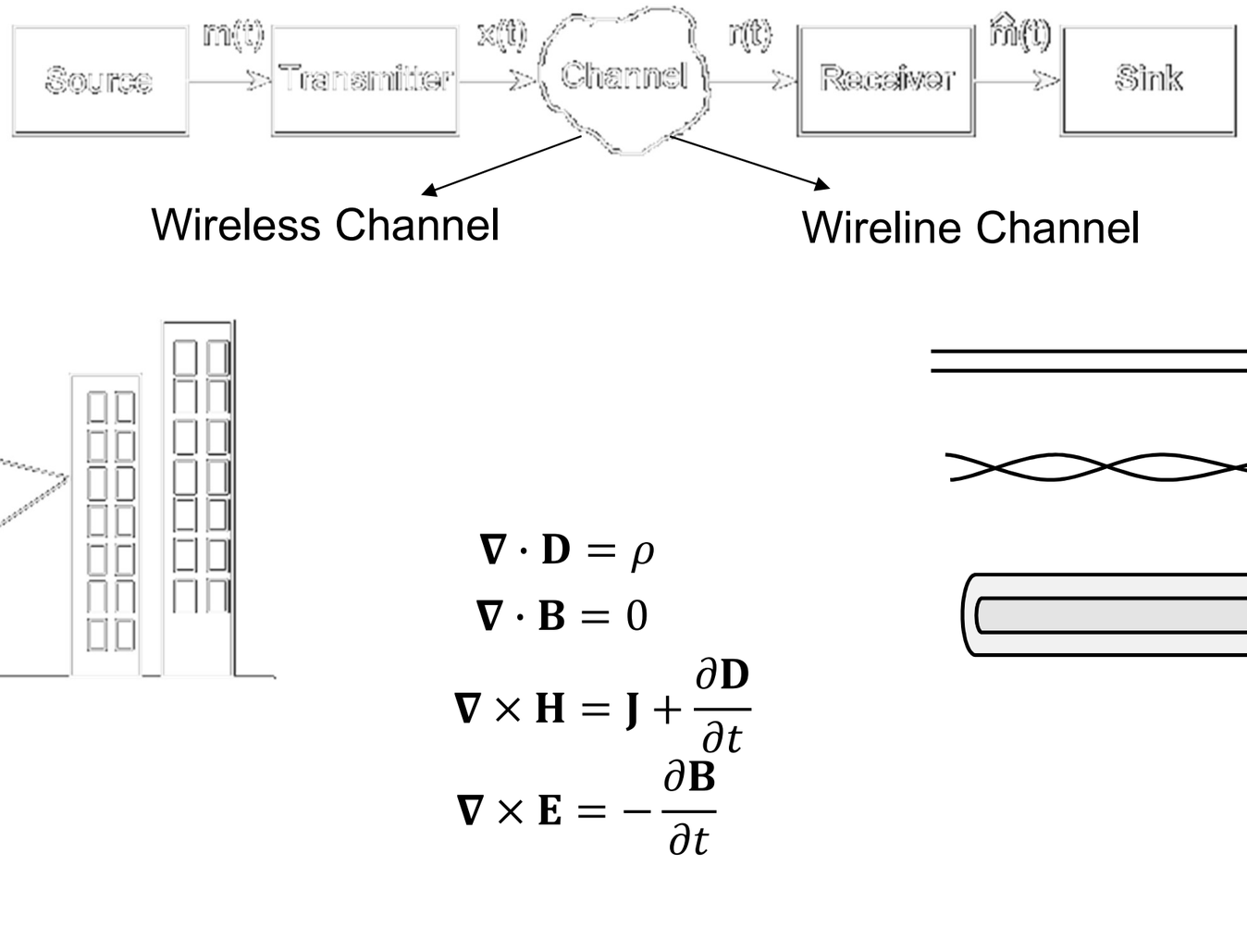
$$v_{out} = A_o(v^+ - v^-)$$

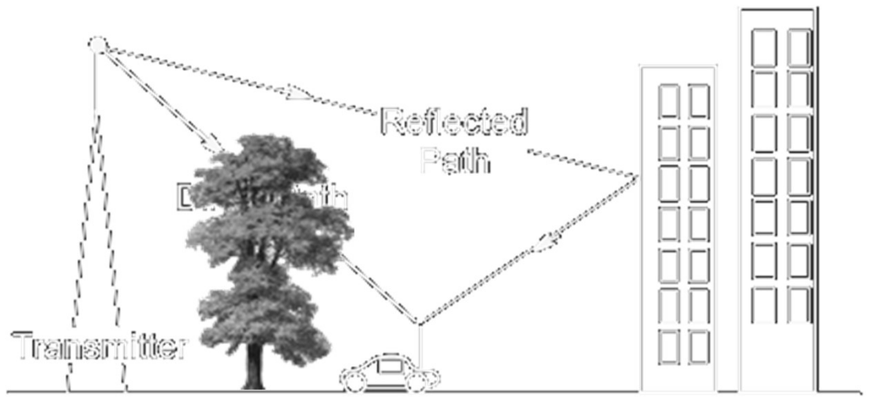




Communication Channels





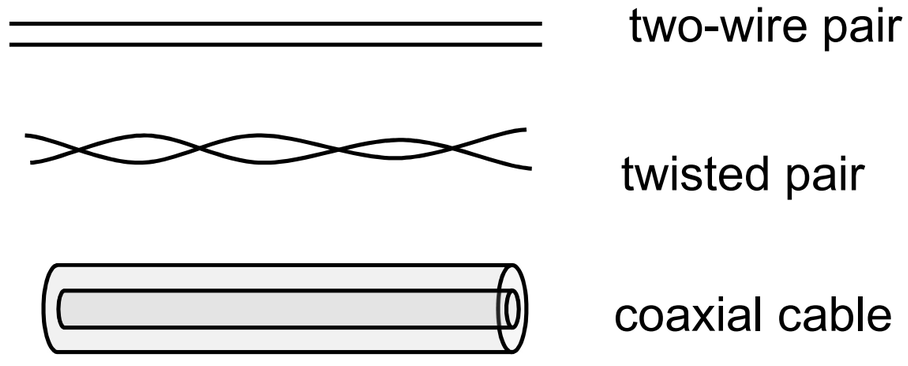


$$\nabla \cdot \mathbf{D} = \rho$$

$$\nabla \cdot \mathbf{B} = 0$$

$$\nabla \times \mathbf{H} = \mathbf{J} + \frac{\partial \mathbf{D}}{\partial t}$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$



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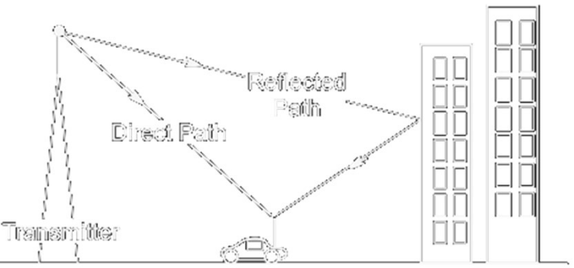
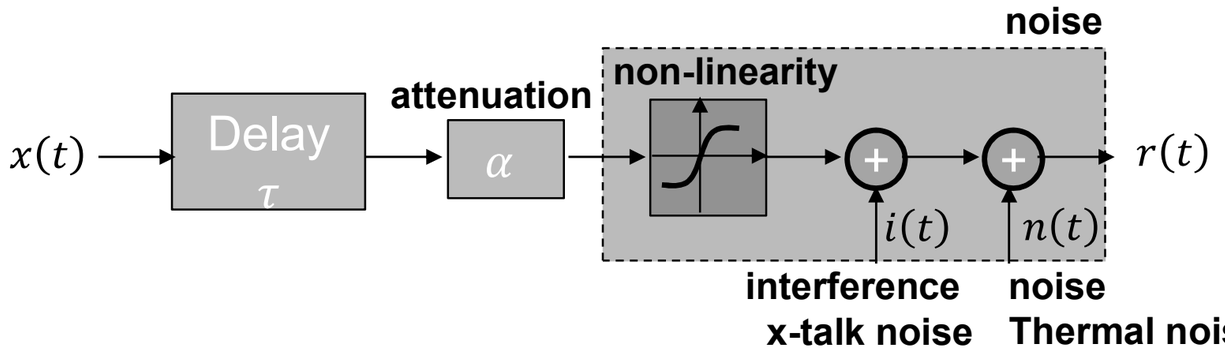
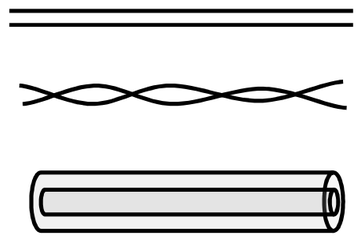
Wireless Channel

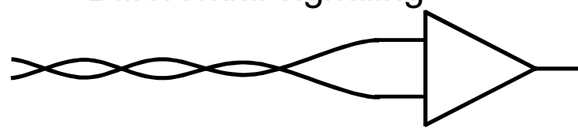
Wireline Channel



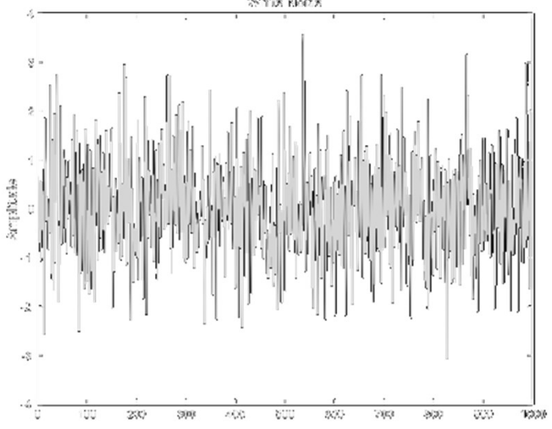




Differential signaling



White noise



	τ	α	$i(t)$	$n(t)$
Wireline	d/c	≈ 1	≈ 0	≈ 0
Wireless	d/c	$\propto d^{-1}$	?!	?!

$$SNR = \frac{power[signal]}{power[noise]}^{dB}$$

amplification, filtering, modulation

end