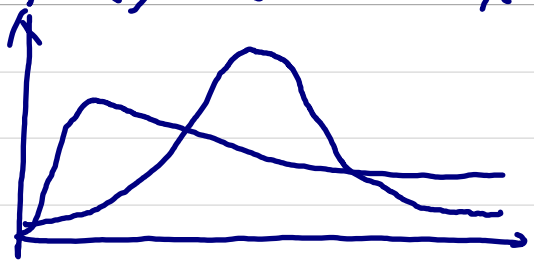
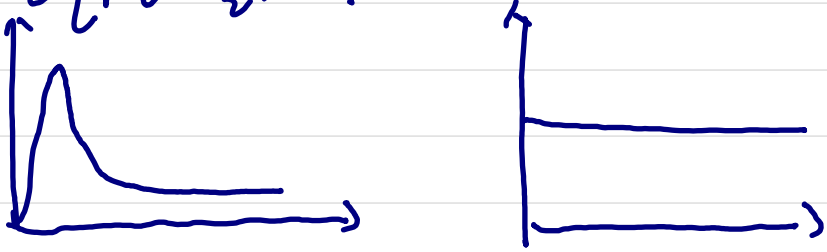
1. $X \sim N(\mu, \sigma^2) \rightarrow X = \mu + \sigma \cdot randn$



log-normal: log S is in normal distribution

$\alpha \sim pow(\cdot)$

2. $sqrt(\frac{1}{2}) \cdot (randn + ii \cdot randn)$

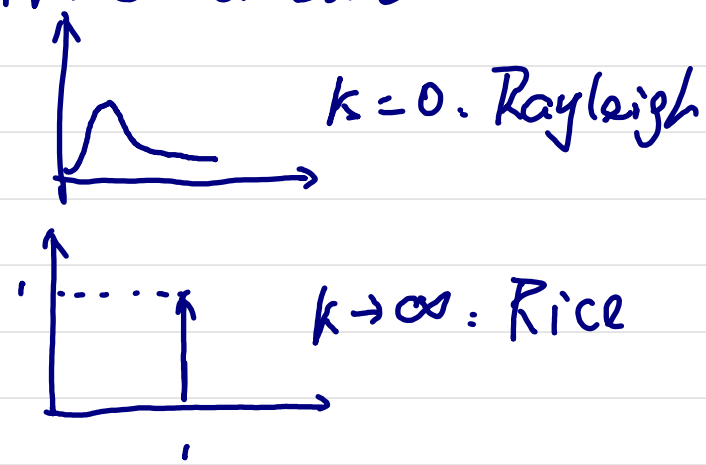


3. $h = \sqrt{\frac{K}{1+K}}\,\tilde{h} + \sqrt{\frac{1}{1+K}}\,\bar{h}$

Ricean factor $K \in \mathbb{R}_{++}$

how much energy is in LOS path

$|h|$ distribution:



4. $n=1$: $|h|^2 \sim Exp(\frac{1}{\sigma^2})$

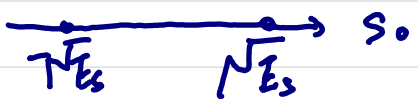
5. AWGN channel: Tx → ⊕ (noise) → Rx

$y = x + n$

fading channel: Tx → ⊗ (channel) → ⊕ (noise) → Rx

$y = hx + n$

BPSK:

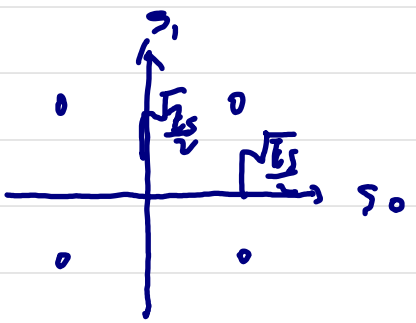


bits: 0 1 0 0 1

↓

symbols { BPSK:
QPSK:

QPSK:



W1: encode < rate
              \ BER

noise → Rx

MRT vs Alamouti: normalize WC

diversity. information symbols pass through multiple independent fading channels.

① repetition coding (t.f.!) same symbol over several paths
- max diversity gain
- no coding gain

② Alamouti

array gain - SNR
diversity gain - # independent fading paths
multiplexing gain - (sum) rate
coding gain - tx power (to achieve same product distance)