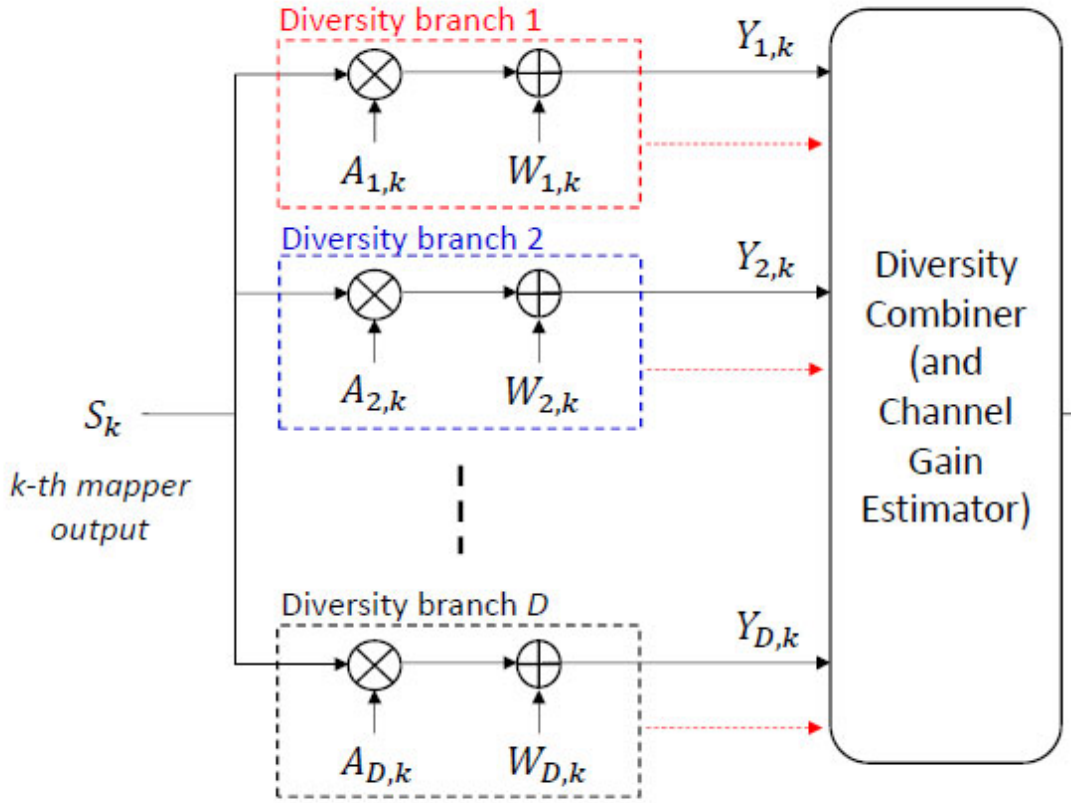


Each diversity branch i has

$A_{i,k}$: Channel gain (complex)

$W_{i,k}$: AWGN sample (complex)

$Y_{i,k}$: MF output (complex)

$$A_{i,k} = \alpha_{i,k} e^{-j\varphi_{i,k}}$$

(as in textbook)

- Three popular techniques to combine the outputs:

1. Selection combining (SC):

$$Y_{\mathrm{SC}} = \arg\max\{|Y_i|\}$$

(Worst performance)

2. Equal-gain combining (EGC):

$$Y_{\mathrm{EGC}} = \sum_{i=1}^{D} Y_i e^{j\varphi_i}$$

3. Maximal-ratio combining (MRC):

$$Y_{\mathrm{MRC}} = \sum_{i=1}^{D} \alpha_i Y_i e^{j\varphi_i}$$

(Best performance)

For best performance, need ***CHANNEL ESTIMATION***

Improvement in *post-combiner* average E_s / N_0 [1]

- SC:

$$\frac{\gamma_{\mathrm{SC}}}{\gamma_0} = \sum_{i=1}^{D} \frac{1}{i}$$

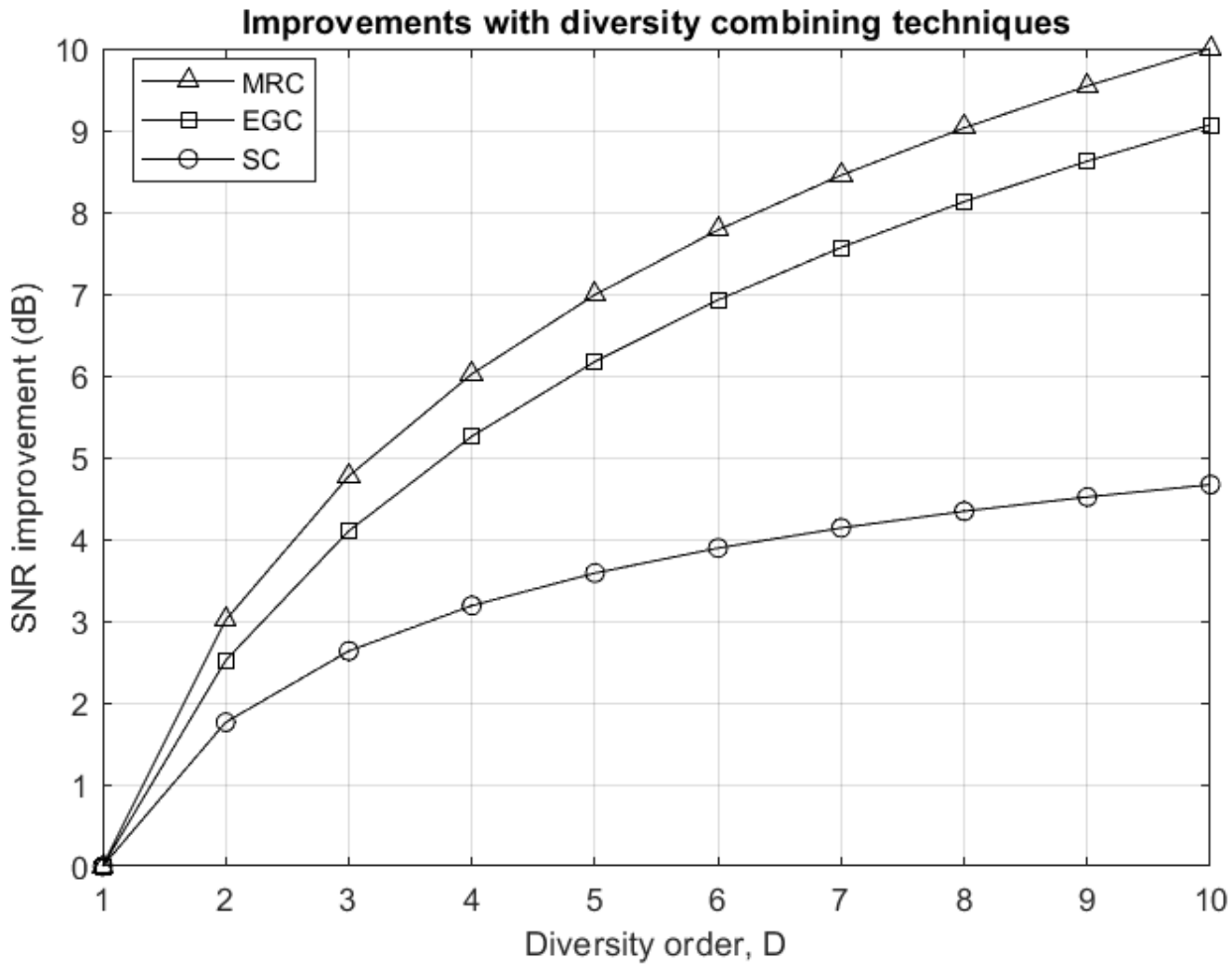
- EGC:

$$\frac{\gamma_{\mathrm{EGC}}}{\gamma_0} = 1 + \frac{\pi}{4}(D-1)$$

- MRC:

$$\frac{\gamma_{\mathrm{MRC}}}{\gamma_0} = D$$

1. P.M. Shankar, *Introduction to Wireless Systems*, Wiley, 2002.



Matlab script: *combiners_improvement.m*