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# Homework IV

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1. (20%) Assume that there are  $L$  ( $L = 1, 2, 3, 4$ ) diversity branches of uncorrelated Rayleigh fading signals. Each branch has the same average symbol energy-to-noise power ratio  $E_s/N_0$ , for  $E_s/N_0 = 1, 3, 5, 7$ , and 9 dB. Simulate the QPSK bit error probability (at least to  $P_b = 10^{-4}$ ) for (a) Selective Combining; (b) Maximal Ratio Combining; (c) Equal Gain Combining; and (d) Direct Combining (which combines all paths directly and then **compensates the overall phase shift** before demodulation).  
(1. You may generate the fading gains via combining a Rayleigh random number and a uniform random phase, or via combining two Gaussian random variables (complex Gaussian). 2. For coherence detection, you must equalize the phase before demodulation.)
2. (20%) Repeat the problem for uncorrelated Ricean fading with  $K = 1$ .
3. (10%) Compare and discuss the results for different cases.
  - 助教: EECS Room 605, [TWNTHUCOM5170@gmail.com](mailto:TWNTHUCOM5170@gmail.com)
  - Due Date: **11/25** (You shall submit your report and program to the class email account.)