社団法人　電子情報通信学会
THE INSTITUTE OF ELECTRONICS,
INFORMATION AND COMMUNICATION ENGINEERS

信学技報
TECHNICAL REPORT OF IEICE.

M1 課題レポート 第 1 回目

りゅう　ゆしん†

† 東京工業大学　〒 152-8550　東京都目黒区大岡山 2-12-1
E-mail: †liuyuchen@radio.ict.e.titech.ac.jp

Technical Report for M1 Labwork 1-st

Liu YUCHEN†

† Tokyo Institute of Technology, 2-12-1, O-okayama, Meguro-ku, Tokyo, 152-8550 Japan
E-mail: †liuyuchen@radio.ict.e.titech.ac.jp

Table 1　ACRONYMS AND FULL MEANING

Acronyms	**Full Form**
MLE	Maximum Likelihood Estimator
QPSK	Quadrature Phase Shift Keying
SNR	Signal Noise Ratio
CNR	Channel Noise Ratio

1. Introduction

Let's introduce the AWGN [1]

2. QPSK and MLE Background

3. Simulation and Result

4. Conclusion

REFERENCE

[1] Wikipedia, "Additive white Gaussian noise — Wikipedia, the free encyclopedia," https://en.wikipedia.org/wiki/Additive_white_Gaussian_noise&oldid=974195879, 2020, [Online; accessed 15-October-2020].

Table 2　BER SIMULATION RESULT

E_b/N_0	BER (With Gray Code)	BER (Without Gray Code)
0	7.89×10^{-2}	1.12×10^{-1}
1	5.62×10^{-2}	8.18×10^{-2}
2	3.80×10^{-2}	5.50×10^{-2}
3	2.30×10^{-2}	3.41×10^{-2}
4	1.27×10^{-2}	1.86×10^{-2}
5	5.93×10^{-3}	8.94×10^{-3}
6	2.50×10^{-3}	3.64×10^{-3}
7	8.06×10^{-4}	1.19×10^{-3}
8	2.04×10^{-4}	2.96×10^{-4}
9	4.52×10^{-5}	6.09×10^{-5}
10	1.48×10^{-5}	3.05×10^{-5}
11	7.80×10^{-6}	1.09×10^{-5}

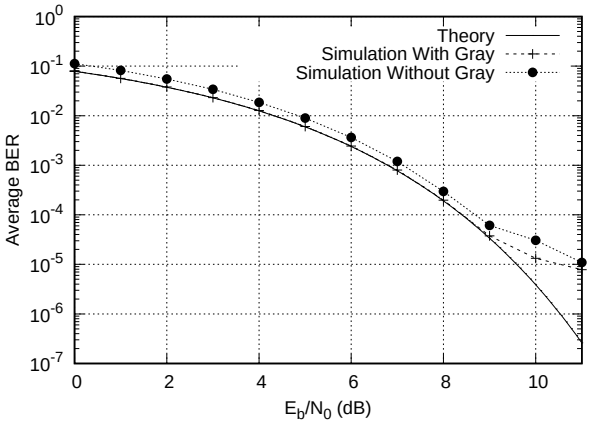

Fig. 1　QPSK MLE Estimation BER in Different SNR