M1課題レポート 第3回

LiuYuchen†

† 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 3rd

Yuchen LIU†

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

Abstract　In this third C workshop, we use C language to simulate fading in wireless communication due to delay and multi-path of transmission. In this workshop, we mainly simulate two fading channel: Rayleigh Fading Channel and Selective Fading Channel. First, we introduce the backgroud knowledge of these two fading channel. Next, we state the whole system desgin and simulation condition. Finally, we can see simulation BER of these two fading channel in different Doppler Shift with different doppler shift compare to theoretical value [1].

Table 1　ACRONYMS AND FULL MEANING

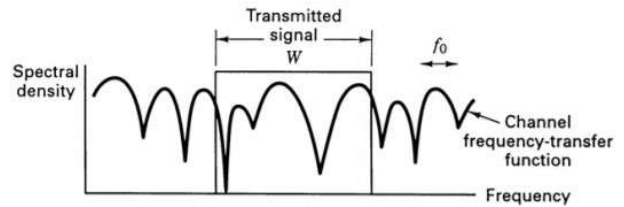| Acronyms	Full Form
MLE	Maximum Likelihood Estimator
QPSK	Quadrature Phase Shift Keying
DQPSK	Differential Quadrature Phase Shift Keying
SNR	Signal Noise Ratio
CNR	Channel Noise Ratio
AWGN	Additive White Gaussian Noise
BW	Band Width

Fig. 2　Illustration of Frequency Selective Fading Channel
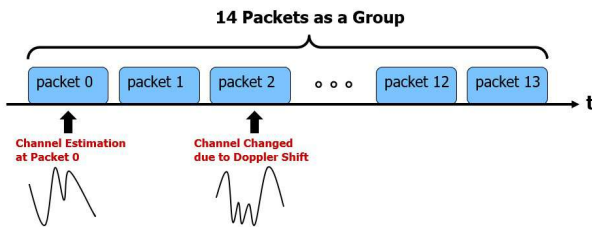

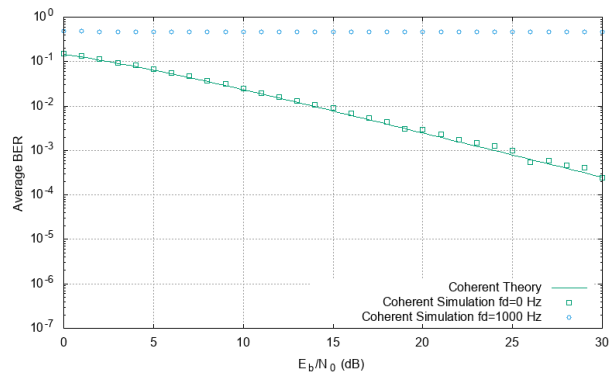
Fig. 1　Illustration of Rayleigh Fading Channel

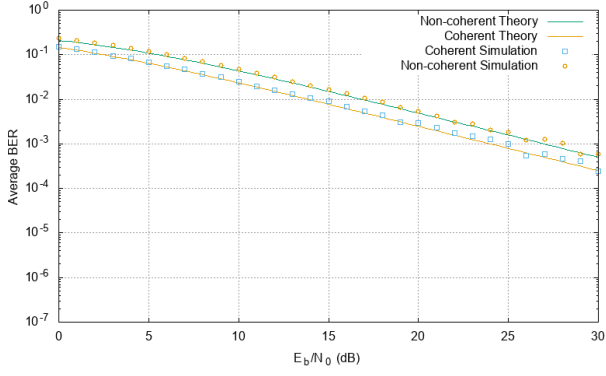Fig. 3　Coherent Demodulation BER with and without Phase Shift in Rayleigh Fading Channel

Fig. 4 Theoretic and Simulation BER without Doppler Shift in Rayleigh Fading Channel
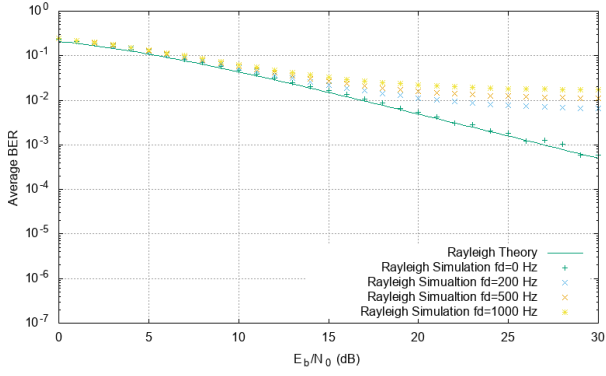

Fig. 5 QPSK and Noncoherent Demodulation BER with Different Doppler Shift in Rayleigh Fading Channel
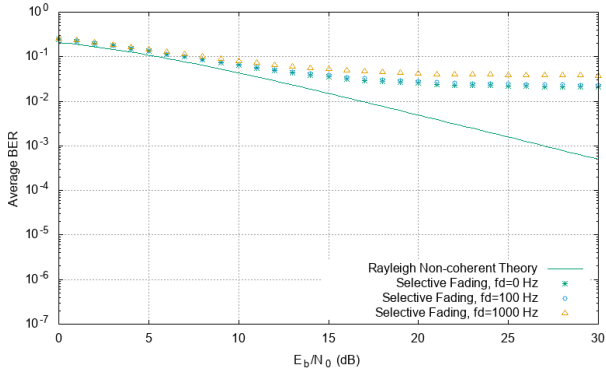

Fig. 6 QPSK and Noncoherent Demodulation BER with Different Doppler Shift in Selective Fading Channel

1. Introduction

2. Simulation Desgin

3. Simulation Result and Conclusion

REFERENCE

[1] A. Goldsmith, *Wireless Communications.*   USA: Cambridge University Press, 2005.

Table 2 SIMULATION CONDITIONS

ITEMS	CONDITIONS
Moduation Method	QPSK/DQPSK
Transmission Bits	128
Group Size	14
Channel	Rayleigh Fading/Selective Fading Channel
Detection	Noncoherent/Coherent Detection
Number of Trials	10^4
Decision Method	MLE
Channel Estimation	$\hat{h} = h$