

ABSTRACT

The use of nanoparticle technology in pharmaceutical technology in the health sector is growing rapidly to support the implementation of nanorobotics in medicine. But, electromagnetic communications has several obstacles to provide communications devices with a very small size, molecular communications is one solution to the problem. Molecular communications is a communication system that can be applied in human body tissues for various purposes. Molecular communications can be an alternative for sending and receiving information in the human body, because communication is carried out at the molecular level. This undergraduated thesis proposes diffusion-based molecular communications with channel coding, which is Repetition codes. Channel coding is really needed in diffusion-based in the molecular communications system to reduce the effect of inter-symbol interferences (ISI), because ISI is a major problem in the molecular communications that is affected by crossover molecules during the process of molecules diffusing in fluid environments.

This undergraduated thesis evaluates performance using the passive molecular communications (PMC) method with diffusion-based, which is free diffusion. This undergraduated thesis also evaluates system performance in terms of bit-error-rate (BER) using computer simulations.

The results of this undergraduated thesis are: (i) Binary Concentration Shift Keying (BCSK) modulation works well in adjusting the threshold, (ii) the more number of molecules sent, the better error is obtained, (iii) The ISI in molecular communications is infinite and makes performance worse, and (iv) using Repetition codes as channel coding with code rate $\frac{1}{3}$, improve the performance of molecular communications . The results of this undergraduated thesis are expected to be a significant contribution in the development of molecular communications in the medical field.

Keywords: Molecular Communications, Repetition Codes, Bit Error Rate, Channel Coding