

ABSTRACT

Wireless Capsule Endoscopy (WCE) is a diagnostic tool in endoscopic procedure to monitor the condition of the gastrointestinal (GI) tract of the human body by transmitting images and videos to the receiver located outside the human body. WCE should provide a high resolution videos and images in order to avoid misdiagnosis, where channel coding is needed to improve the performances of the system.

This undergraduate thesis proposes Raptor Codes as a channel coding scheme having the rateless capability to improve the performance of the WCE communication system. The proposed Raptor codes are constructed from 5G standardized Low-Density Parity Check (LDPC) codes and Luby Transform (LT) codes. This thesis considers LT codes using the Soliton degree distribution as the optimum degree distribution providing good rateless capability. The decoder uses iterative decoding, of which the efficiency is evaluated using extrinsic information transfer (EXIT) chart and EXIT trajectory.

The proposed Raptor codes is evaluated in terms of bit error rate (BER) using a series of computer simulations under Additive white Gaussian noise (AWGN), Rayleigh fading, and In-Body-to-On-Body Multipath Rayleigh fading channels. This undergraduate thesis uses Cyclic-Prefix Orthogonal Frequency Division Multiplexing (CP-OFDM) to mitigate Intersymbol Interference (ISI) due to the transmission under the Multipath fading channels. The results confirmed that the proposed rateless Raptor codes can adapt well to the varying channel conditions and are suitable for the development of WCE communication system.

Keywords: WCE, EXIT chart, Raptor Codes, LDPC codes, LT codes, CP-OFDM.