ABSTRACT

Extrinsic Information Transfer (EXIT) chart can be used to select and design the best suitable coding channel because the characteristics of a system can be seen visually. Accumulator codes can be combined with channel coding and demapping to obtain the best matching to minimize the loss. However, currently no closed-form expression is available for the EXIT curve of Accumulator codes causing difficulty in analysis of various types of channel coding or demapping combined with Accumulator codes. This thesis proposes a closed-form expression for the EXIT curve of Accumulator with various doping rates (P), which is expected to be useful for analysis of various types of channel coding and communication blocks performing iterative decoding.

This thesis simulates an iterative decoding system to confirm the proposed EXIT Accumulator codes curve. The simulation results are used as a valid closed-form expression reference for various levels of a signal-to-noise power ratio (SNR) and P values. For larger P, since it is difficult, the proposed closed-form expression is obtained through the analysis of the mutual information exchange between the check node and the variable node connected in the Tanner graph of decoder analyzed on binary erasure channels (BECs).

This thesis results a closed-form expression for EXIT Accumulator codes curves with various SNR levels and P values. This thesis found that every increase in the value of P causes a weaker ability of Accumulator codes in correcting errors indicated by the end of EXIT curve below (1,1). The results of this thesis are expected to contribute to the development and research of channel coding and demapping in the future, including assisting the development of artificial intelligence (AI) for decoding and demapping.

Keywords: EXIT curve, Accumulator codes, doping rate, closed-form expression.