1046-94-1540 **Eric Thomas Psota*** (epsota24@bigred.unl.edu), 329E Walter Scott Engineering Center, Lincoln, NE 68588. *Extrinsic Tree Decoding of LDPC Codes.*

Low density parity check (LDPC) codes are capable of exceptional performance when decoded with iterative message-passing decoders such as the sum-product (SP) and min-sum (MS) decoders. The behavior of these decoders is optimal on codes whose graphical representation (Tanner graph) is a given by a tree. Unfortunately, practical codes are seldom represented by a tree, and analysis is difficult when the Tanner graph contains cycles. In his thesis, Wiberg introduces the computation tree as a tool for modeling the SP and MS algorithm. While, in theory, this tool allows one to predict the performance at any given iteration, the size of the computation trees makes it impractical to analyze.

Here, we introduce a new decoding method called Extrinsic Tree (ET) decoding. This new decoder operates by building finite computation trees with a minimal number of copies of each variable node. This construction does not allow single channel errors to reinforce themselves and infect the rest of the graph. Another advantage of ET decoding is that performance can be bounded using the size and multiplicity of the deviation set. Lastly, it can be shown that ET decoding performance can be improved by manipulating the parity check matrix of the code in ways that SP/MS decoding can not. (Received September 15, 2008)