1011-94-315 **Judy L. Walker*** (jwalker@math.unl.edu), Department of Mathematics, University of Nebraska, Lincoln, NE 68588-0130. *LDPC codes and their pseudocodewords.*

One of the greatest achievements in modern coding theory is the development of low density parity check (LDPC) codes. These codes are presented as kernels of sparse matrices and come equipped with an extremely efficient iterative decoding algorthim that corrects, with high probability, many more error patterns than are guaranteed by the code's minimum distance. The low complexity of the algorithm results from the fact that it operates locally on a bipartite graph T associated to the code. This also causes the algorithm's primary weakness: since operations are done locally, the decoder cannot distinguish between T and a finite cover of T. In other words, pseudocodewords—vectors associated to codewords in codes corresponding to finite covers of T—interfere with the decoding process. We discuss two characterizations of pseudocodewords, one analytic and one algebraic. The analytic characterization relates pseudocodewords to the so-called fundamental cone, which is cut out of R^n by inequalities determined by the matrix defining the code; the algebraic characterization relates pseudocodewords to monomials appearing in a graph zeta function that was first studied by Bass and Hashimoto.

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