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A DECODING PROCEDURE FOR MULTIPLE-ERROR-CORRECTING CYCLIC AN CODES, Wen-Yung Yeh (Department of Electrical Engineering, Northeastern University, Boston, MA 02115). A decoding procedure for multiple-error-correcting arithmetic cyclic codes is proposed. For cyclic AN codes $C_r(n,B,t)$ with information rate $\log_r B/n$ less than 1/t, the error trapping technique will correct all correctable error patterns. If the information rate is larger than 1/t but less than 2/t, a modified error-trapping decoding scheme has been developed. Fortunately it turns out that all useful multiple-error-correcting cyclic AN codes with block length n less than 58, listed in the appendix B of a previous thesis by Larson, can be decoded effectively by this algorithm.

ARITHMETIC CODES IN RESIDUE NUMBER SYSTEMS, Ferruccio Barsi and Piero Maestrini (Istituto di Elaborazione dell'Informazione del CNR, Pisa, Italy). Residue Number Systems (RNS) provide a means to construct non-binary, multiple error correcting arithmetic codes. In this paper two different codes, namely systematic codes in RNS and AN codes in RNS are considered and their properties are discussed in detail. A lower bound to redundancy allowing t-correction in a class of codes including those under consideration is reported and it is shown that systematic codes and AN codes in RNS reach this bound. In both codes, error correction is achieved by finding appropriate solutions to a key congruence. Two different decoding procedures are presented. The first one, although working with any t-correcting code, is computationally inefficient for high values of t. The second procedure, based upon the euclidean algorithm for integers, is very efficient but requires an amount of redundancy slightly above the lower bound. The error correcting procedure based upon the euclidean algorithm was previously known for AN codes in RNS. In the case of systematic codes in RNS, this procedure is faster than the best previously known procedure, requiring multiple iterations of an algorithm based on convergence of continued fractions.