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(54) **INTERLEAVER DESIGN AND PAIRWISE CODEWORD DISTANCE DISTRIBUTION ENHANCEMENT FOR TURBO AUTOENCODER**

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(57) **ABSTRACT**

A symmetric interleaver for a Convolutional Neural Network (CNN) and Recurrent Neural Network (RNN) encoder and a circular padding mode are disclosed. The interleaver interleaves elements of an input block to form an output block in which an output neighborhood of elements for each element of the output block is symmetric to an input neighborhood of elements for each element of the input block. A position of an element of the input block is interleaved based on an index i of the position times a parameter δ modulo K in which the parameter δ is relatively prime with K. A test loss function may be used to train the encoder that includes a Binary Cross Entropy (BCE) loss function plus a function that minimizes a number of codeword pairs based on a Euclidean distance. The RNN encoder may be implemented as part of a Turbo Autoencoder (TurboAE) encoder.