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(54) **DECODING SIGNALS BY GUESSING NOISE**

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(57) **ABSTRACT**

Devices and methods described herein decode a sequence of coded symbols by guessing noise. In various embodiments, noise sequences are ordered, either during system initialization or on a periodic basis. Then, determining a codeword includes iteratively guessing a new noise sequence, removing its effect from received data symbols (e.g. by subtracting or using some other method of operational inversion), and checking whether the resulting data are a codeword using a codebook membership function. This process is deterministic, has bounded complexity, asymptotically achieves channel capacity as in convolutional codes, but has the decoding speed of a block code. In some embodiments, the decoder tests a bounded number of noise sequences, abandoning the search and declaring an erasure after these sequences are exhausted. Abandonment decoding nevertheless approximates maximum likelihood decoding within a tolerable bound and achieves channel capacity when the abandonment threshold is chosen appropriately.