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Theme: Spatially coupled channel coding design and analysis

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Abstract

The growing need for cheaper communication and storage systems, faster and more reliable has forced many researchers to look for ways to reach the ultimate limits of reliable transmission and storage of information. Since the discovery of turbo-codes and the subsequent rediscovery of LDPC codes a few years later, the field of channel coding has undergone several major advances. Until then, code designers were generally satisfied with the performance within a few decibels of the Shannon boundary, whereas new coding techniques now allow performance at a decibel fraction with modest coding and decoding complexity.

Due to these significant improvements, coding standards in applications as diverse as mobile wireless communication, satellite television and communications in distant space are being updated to incorporate new techniques.

In this work, we will present the structure and construction of the new particularly interesting spatial-coupled code classes, the LDPC codes, which promise excellent performance in a wide range of channel conditions. We will also analyse the decoding techniques recommended for this class.

Since spatial coupling is equivalent to the introduction of memory into the coding process, We will try to implement both a simple construction all by maintaining satisfactory decoding performance to meet the requirements of the current standards of communication systems.

Keywords: Channel coding, Spatially coupled coding, LDPC codes, Shannon boundary, Coding and decoding techniques.