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ZERO-ERROR SHIFT-CORRECTING AND SHIFT-DETECTING CODES

Motivated by communication scenarios such as timing channels and bit-shift channels, we study the error control problem in cases where the dominant type of noise are symbol shifts. In particular, we look at several channel models, determining their zero-error capacities by explicit constructions of optimal zero-error codes.

In our first model, the information is stored in an n-cell register, where each cell is either empty or contains a particle of one of P possible types. Due to the imperfections of the device every particle is shifted k cells away from its original position over time, where k is drawn from a certain range of integers, without the possibility of reordering particles. Several variations of the above model are also discussed, e.g., with multiple particles per cell, with additional types of noise, and the continuous-time case.

This is joint work with Mladen Kovačević and Vincent Tan.