Variable cross-correlation code construction for spectral amplitude coding optical CDMA networks

Abstract

We present, for the first time, several aspects of incoherent optical code-division multiple access (OCDMA) codes, focusing on the flexible variable cross-correlation code allocation and its potential for future optical networks. We briefly present a new version of the Random Diagonal (RD) codes for Spectral-Amplitude Coding (SAC) OCDMA approaches. We then concentrate on the properties specific to such schemes allowing for its increased scalability and flexibility. The main coding properties are reviewed. The RD codes provide simple matrix constructions compared to the other SAC-OCDMA codes such as Hadamard, MQC and MFH codes. This code possesses such a numerous advantages, including the efficient and easy code construction, simple encoder/decoder design, existence for every natural number n, and variable in-phase cross-correlation and easy to implement using Fiber Bragg Gratings (FBGs). Finally, a new detection scheme called "*NAND*" detection is developed for the variable cross-correlation RD code.