

Design considerations of high performance optical code division multiple access: a new spectral amplitude code based on laser and light emitting diode light source

Abstract

A new code of optical code division multiple access (OCDMA) based on spectral amplitude coding (SAC) is described and analysed. The coding technique is called random diagonal (RD) code. One of the important properties of this code is that the cross-correlation at data segment is always zero, which means that phase intensity induced noise (PIIN) is reduced. From the construction of RD code sequence, the authors can see that the RD code is constructed using code segment and data segment. Using this code property, RD code is implemented using coherent source (multi-laser) and incoherent source (light emitting diode) for the code segment and data segment, respectively. RD code using two multi-sources (incoherent and coherent) can be considered as an effective way for maximising the capacity while minimising the cost of SAC-OCDMA. It is shown that the system using this new code matrices not only suppresses PIIN, but also allows a larger number of active users compared with other codes.