The Effect of FWM and SRS on the Performance of WDM Systems with Optical Amplifiers

KAMEL MOHAMED MAHMOUD HASSAN , Bazan, Taher M. Shafie, Amr H.

Abstract

The performance analysis of wavelength division multiplexing (WDM) systems under the influence of nonlinear fiber effects is evaluated. A mathematical model of WDM system with optical amplifiers is derived taking into consideration the combined effect of four-wave mixing (FWM) and stimulated Raman scattering (SRS) with the amplified spontaneous emission (ASE) noise. The impact of transmitted power, frequency separation and fiber type is also investigated. In addition, the channel allocation technique to enhance the system performance is examined. The results show the detrimental effect of the FWM in conjunction with SRS at high power levels. In addition, the analysis reveals that the wavelength separation achieving the best performance in the presence of SRS and FWM is found to be 0.3 nm.

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