Investigation of Four Wave Mixing Effect at Different Transmission Power Levels and Channel Spacing

Abstract

There is an incredible focus on broadband fiber optical transmission system as it offers many advantages over other communication systems such as large bandwidth and significantly low losses [1]. This high bandwidth in optical communication networks is further increased by using Wavelength Division Multiplexing. In WDM based fiber optical communication systems nonlinearities in fiber are a limiting factor which degrade the system performance and limit the data rate and bandwidth of the system [3]. As we increase the transmission power levels so as to transmit data for long-haul communications systems these non linear effects tend to accumulate. Due to these non linear effects, all input signals may interact with each other in a complicated way which degrades overall performance of optical communication system. In WDM systems, the interaction of input signals with each other adversely affects the performance of the system. Hence it is of great importance to understand fiber non linear effects and its effect on optical fiber communication system. The main objective of this paper is to study non linear effects in fiber optic communication system mainly Four Wave Mixing (FWM) and to analyze to effect of increasing optical transmission powers and channels spacing in a wave
The results show that as the transmission power is increased, the efficiency of four wave mixing effect increases. Also if the channel spacing in a WDM system is kept uneven, the power levels of mix frequencies produced as a result of FWM effects is reduced to a considerable amount.

References


Index Terms

Computer Science  
Signal Processing
Keywords

Wave Division Multiplexing (WDM), Four Wave Mixing (FWM), channel spacing, transmission power level, non linear effects