

Abstract

Moustafa Hussein Aly

A wideband apodized FBG dispersion compensator in long haul WDM systems

This work introduces a new design of wideband dispersion-compensation (WBDC) apodized chirped fiber Bragg grating (ACFBG) unit that covers the entire C band. Its length is chosen to be with the maximum apodized fabricated length of 30 cm that grants a dispersion of -66.7 ps/nm/km. This design is compared with multi-narrow band ACFBG in a long haul wavelength division multiplexing system of 3000 km at different bit rates. The obtained results reveal that the multi-narrow band system is better than WBDC system at low bit rate (i.e. 10 Gbps) achieving a quality factor 30% of its maximum value at mid distance. However, WBDC transmits signals with higher bit rates as 20 Gbps for 1800 km and 40 Gbps for 1000 km, while multi-narrow band system cannot transmit signals with higher bit rates at all. Moreover, generally multi-narrow band units have a multiple FBG spaced from each other, which requires high temperature stability. In the other hand, WBDC CFBG does not need a temperature controller (i.e. no internal gaps between channels).