ESTIMATION OF OPTICAL FILTER NARROWING IN HIGH SPEED WDM SYSTEMS

Oskars Ozolins[1], Girts Ivanovs[2]

[1,2]*Scientific Institute of Telecommunications, Riga Technical University, LV-1048 Riga, Latvia*
e-mail: oskars.ozolins@rtu.lv

In this paper we demonstrate performance of three different optical filter transfer functions: Lorentzian, Raised Cosine and Supergaussian, and their influence on non return to zero (NRZ) coded optical signals in wavelength division multiplexing (WDM) transmission systems with different channel spacing and data transmission speed values. The effect of filter's full width half maximum (FWHM) bandwidth's influence on NRZ code format and spectral narrowing on signal quality has been studied extensively. Simulation scheme consists of four channels. Author has chosen this channel count values to evaluate influence of nonlinear optical effects (NOE): self – phase modulation (SPM), cross – phase modulation (XPM), four – wave – mixing (FWM) to used optical filters performance [1].

The main idea of our simulations is to demonstrate the effect of filter's FWHM bandwidth influence on NRZ optical signals quality. Investigation of effective optical band-pass filters transfer functions are groundwork for realization of high speed WDM transmission systems. The main problem is to choose appropriate optical filter amplitude transfer function for exploitation in HDWDM transmission systems. Therefore we have taken three different optical filters transfer functions (see Fig.1.) [2].

We foresee that for 40 Gbit/s data transmission speed NRZ coded optical signal effective filter's FWHM bandwidth value must be greater than 0.4 nm or 50 GHz (see Fig.2.).

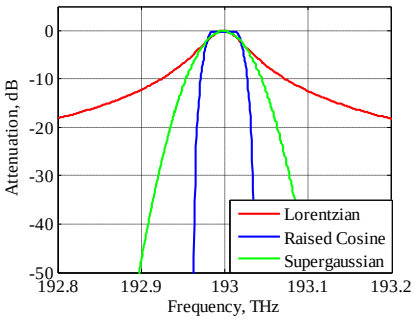

Fig.1 First order amplitude transfer functions of 0.4 nm or 50 GHz of different optical filters shown in inset.

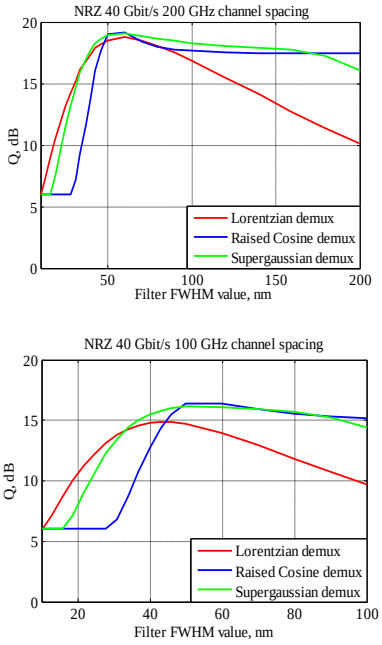

Fig.2 Q factor dependence from FWHM parameter value for different optical filter transfer functions: Lorentzian, Raised Cosine and Supergaussian.

References

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