ABSTRACT

Raman optical amplifier (ROA) is an optical amplifier that produces noise during the amplifying process. One of the noise is amplified spontaneous emission (ASE), which is a noise that cannot be prevented and is always present in ROA. Because of that reason, a filter is needed to reduce this noise.

In this final project, fiber Bragg grating is chosen to be the filter used to reduce ASE noise in ROA. Then, analysis of the effects caused by existing parameters to Raman gain spectrum change and ASE noise spectrum change before and after FBG filter is performed.

With λ_p = 1450 nm, Raman gain peak is on Raman shift 437 cm^{-1}. Maximum Raman gain is 43.3982 dB when x = 100 mol%, is 6.3433 dB when L = 100 km, and is 30.5277 dB when P_p = 1000 mW. Maximum P_{ASE} is 0.098 mW on 429 cm^{-1} when P_p = 1000 mW, is 0.393 mW on 200 cm^{-1} when L = 25 km, is 0.2014 mW on 200 cm^{-1} when x = 12 mol%. Then, when the arising ASE power in a condition of L = 100 km, P_s = 1 mW, P_p = 600 mW, and x = 8.3 mol% is reduced (flattened) with an FBG filter which has $n_g = 5x10^{-3}$, λ_B = 1545.9 nm, and N = 180; a flat noise power spectrum is made with a bandwidth of 8.3352 nm or 1.0493 THz.

Keyword : Raman optical amplifier, amplified spontaneous emission, fiber Bragg grating, Raman gain