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Production d'impulsions optiques de fréquence de répétition 200 GHz pour la transmission en télécommunications bande C.

A. Hamouda, M. Haddag , L. Hamhoum
AIN MLILA ISTA, Department of Materials Science, Univ-OEB, Algeria.

ABSTRACT

From the simple components with three laser diodes, an all-optical source delivering a very high-frequency bit rate of 200 Ghz for the transmission of information and data in C-band telecommunications was simulated.

Keyword: laser diodes, all optical, flow, transmission, band C.

1. INTRODUCTION

Advanced telecommunication is very long distance transmission, and especially marine, requires the generation of optical pulses repetition frequency of about 100 Ghz [1], or for fixed networks that have physical media (cables coaxial, optical fibers), or hertzian waves. Ultra-short pulse generators with different repetition rates on a 1555 nm wavelength carrier are widely used in many scientific applications [2, 3]. Thanks to rapid progress in chemistry, very low loss coefficients of around 0.2dB / km around 1550 nm were reached in the 1970s, bringing the amount of light delivered after 1km of propagation to 95%[4].

II. Theoretical study :

II.1. Synoptic diagram of the generator:

This optical pulse generator consists of three blocks (see Fig. 1)

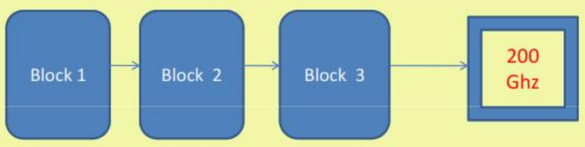

Fig. 1 Synoptic diagram of generator

II.2. Block 1 :

This block behaves to a laser diode (CW laser) delivering an optical signal of 50 mW continuous injected within an ideal isolator [5,6] plays the role of not allowing the return of the component reflects, the resulting signal modulated using a mach-zender modulator (see Fig. 2).

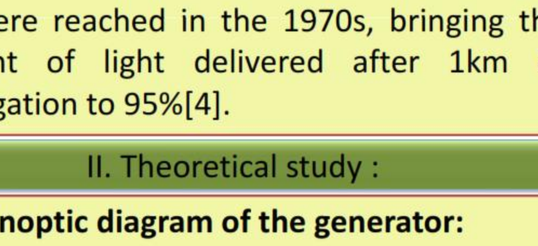

Fig. 2 Diagram Block 1.

II.3. Block 2 :

Le signal à la sortie du modulateur mach-zender est injecté à l'entrée d'un coupleur de ce block, chaque signal à la sorite des deux parties du ce coupleur sera pompé à l'aide de deux autres diodes laser comme indiqué au schéma optiques ci-dessus (voir fig. 3).

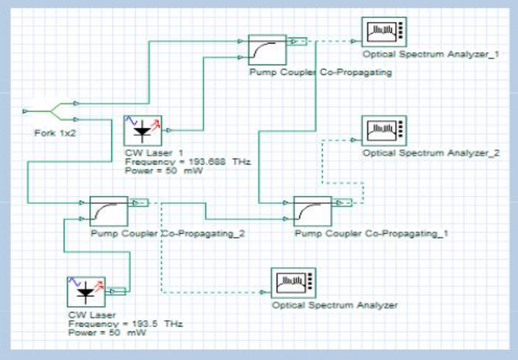

Fig. 3 Diagram of Block 2.

II.4. Block 3:

The two previous signals S11 and S21 are injected at the input of a coupler pump which itself attacks the photo-detector PIN (see Fig. 4).

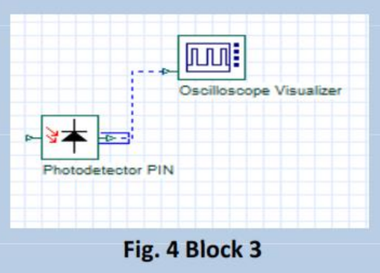

Fig. 4 Block 3

III. Results and discussions :

- From the values of the parameters of the components mentioned above, the following results were obtained by simulation on the OPTISYSTEM version 7 [7] software: The signal at the output of the Mach-zender modulator is of the order of 40 GHz (see Fig. 5).

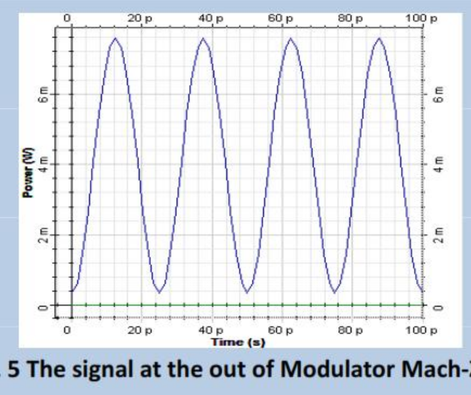

Fig. 5 The signal at the out of Modulator Mach-Zender

the signal at the output of the last block (see Fig. 6), the number of pulses is for a period of 100 ps, we will therefore have a repetition frequency of 200 Ghz, (Fig. 7) represents the spectrum of signal at the source output.

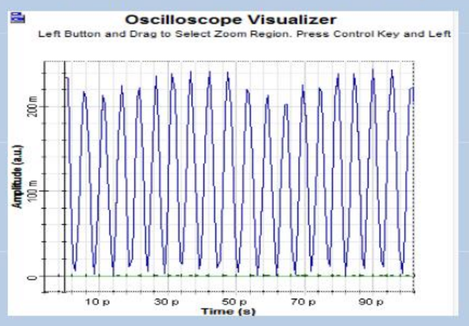

Fig. 6 The signal at the out of the generator

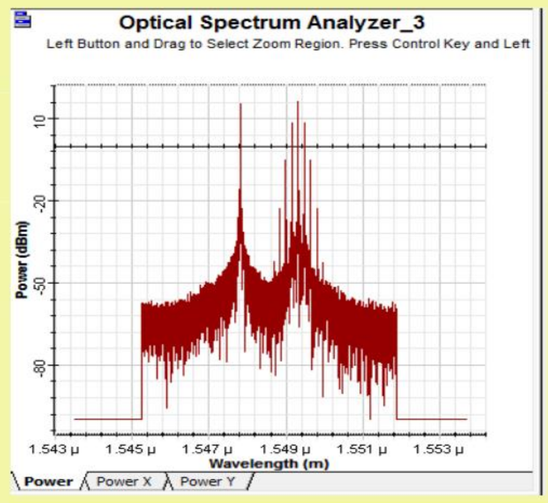

Fig. 7 Spectral Signal at out of the Generator

IV. CONCLUSIONS

The frequency of repetition of our generator, is the result obtained from the difference between the two frequencies of the two secondary laser diodes, this generator is based on simple components, easy to realize, the wavelength of this signal is of the order of 1555 nm, which allows us to use it in telecommunications band C.

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Contact Information

Hamouda Amar

Address
BlocK D, N° 13, Fehati Hmida city, Oum El Bouaghi, Algeria.

Tel:
0774968712

Email:
amarhamouda23@gmail.com