Title : HIGH SATURATION IN A NONLINEAR OPTICAL AMPLIFIER

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Abstract

From some years ago, one of the devices which has proved to be most interesting in Optoelectronics and in fibre optic digital transmission systems is the semiconductor laser amplifier [1],[2].

As it amplifies light directly, its use makes possible to eliminate the double opto-electric and electro-optic conversions thus reducing the number of electronic components and their typical problems. Other advantages like its high bandwith and low consumption, make that the semiconductor optical amplifier, working in the linear regime, be an ideal device for digital fibre optic transmission systems.

Unfortunately, and mainly due to quantum noise, the optical amplifier doesn't respect the statistic of the light wanted to be amplificated. In order to calculate the signal to noise ratio it is necessary to characterize statistically the amplifier and in so doing to know the output moments from those of the input.

On the other hand, if all the phenomena which take place in the amplification process are taken into account, we can conclude that the optical amplifier, actually, always

works in the nonlinear regime [3]. This is due to the input light power level and the saturation parameter of the device.

By using a method developed by the authors for the calculation of the amplified light statistic [4], in this work results about the nonlinear behaviour of the optical amplifier under high saturation conditions are presented.

It is seen how the behaviour of the device in such conditions can improve the signal to noise ratio under some design requests. Basically this can be done because it is possible to amplify the average power of the input light without increasing considerably its variance.

References

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