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All-optical logic OR gate based on two-photon absorption in semiconductor optical amplifier

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The performance of all-optical logic OR gate has been simulated. This Boolean operation is realized by using a semiconductor optical amplifier (SOA) and delayed interferometer (DI) based on two-photon absorption (TPA). The input intensities are high enough so that the two-photon induced phase change is larger than the regular gain induced phase change. The study is carried out when the effect of amplified spontaneous emission (ASE) is taken into account in the simulation analysis. Results show that this logic gate is capable of operating at a data speed of 250 Gb/s with proper quality factor (Q-factor). The dependence of the output Q-factor on signals and SOA parameters is also investigated and discussed.

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