修士論文要旨

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論文題目　　　PC-QDSOAを用いた全光ANDゲートの提案と性能評価

Proposal and performance evaluation for all-optical AND gate using PC-QDSOA

In this paper, we propose an all-optical AND gate using Photonic Crystal Quantum Dot Semiconductor Optical Amplifiers (PC-QDSOA). Two PC-QDSOAs compose the proposed gate which can reduce device volume and energy consumption required for all-optical AND gate. The proposed gate exploits Cross-Gain-Modulation (XGM) in the PC-QDSOAs.

Two input signals and clock signal are injected into the proposed gate. Consider the two input signals to be input A and input B, input A and clock signal are injected into one PC-QDSOA, and input B and clock signal from the PC-QDSOA are injected into another PC-QDSOA. The schematic enables A AND B operation only when the powers of input A and input B are significantly large.

In order to show the proposed gate can operate as AND gate, we show the input-output characteristics by simulation and the proposed gate can operate at 160Gbps. Moreover, we use extinction ratio (ER) and quality factor (Q-factor) to evaluate the proposed gate with varying parameter. The evaluation results show ER and Q-factor are improving as more current injection. In addition,