OPTICAL LOOP ENHANCED OPTICAL MODULATOR ON SILICON PHOTONICS

UQAM-095

Keywords: Optical modulator, Si photonics, Mach-Zehnder modulator

ALIGO INNOVATION

PARTNER INSTITUTION:

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

BACKGROUND

Today the Internet comprises over 100 billion plus web pages on over 100 million websites being accessed by nearly 3 billion users conducting approximately 3 billion Google searches per day, sending approximately 150 billion emails per day.

In this context, modulators are key components for data transmission. Moreover Mach-Zehnder optical modulators are crucial devices for fast electrical-to-optical conversion in telecoms.

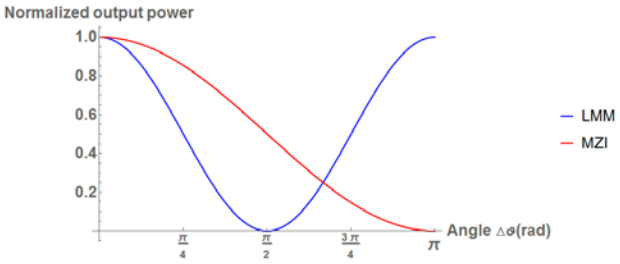
Due to its CMOS compatibility, proven manufacturing record and price efficiency, Silicon (Si) is a good choice to be used in optical interconnect technology. It is seen as an inexpensive solution for coherent links and short reach optical interconnects.

TECHNOLOGY

This loop mirror optical modulator integrated on silicon chip is based on reverse-biased pn junctions and on a Mach-Zenhder design. Due to the integration of a loop mirror it requires lower drive voltage and thus consumes less power than a conventional Mach-Zehnder based optical modulator.

COMPETITIVE ADVANTAGES

The loop mirror Mach-Zenhder modulator requires half the phase shift than regular Mach-Zehnder for full modulation, which results in lower power consumption.



Phase shift comparison between regular Mach-Zehnder interferometer (MZI) and lopp mirror modulator (LMM)

APPLICATIONS

This technology is particularly suited for data center networks and metro telecom applications where the data traffic is dramatically increasing each year, and where there are increasing demands for larger bandwidth and higher capacity. Potentially tens of thousands of optical links need to be integrated with CMOS compatibility in order to reduce space and the required power consumption.

TECHNOLOGY DEVELOPMENTAL STAGE

A few prototypes optimized for 1550 nm have been made on silicon chips and have been tested at up to 20 Gb/s with on-off keying modulations. Demonstrations of PAM-4 and DPSK transmission are underway.

PATENT STATUS

Patent pending for the USA.

BUSINESS OPPORTUNITY

Partnering/licensing opportunities

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