

INTRODUCTION

Knowledge | Sincerity | Excellence

The idea of using shift registers to generate sequences of ones and zeros has been explored and developed decades ago. Nowadays, the shift register is being transformed from its electronic version to optical based designs due to the demand in high speed all-optical communication and photonic processing. The all-optical shift register employs semiconductor optical amplifier (SOA) has become popular due to its integrability and low switching energy requirement. In this project, the circulating shift register with an inverter using an SOA in a nonlinear loop mirror is presented.

METHODOLOGY

RESULT

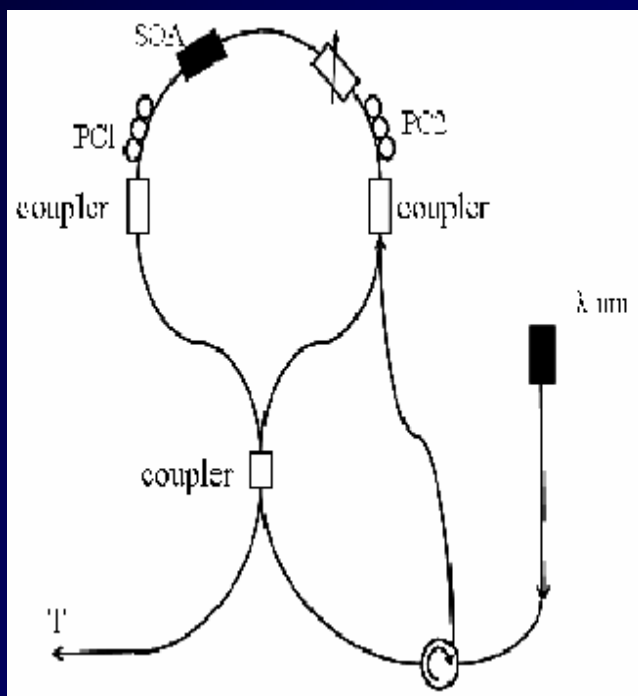
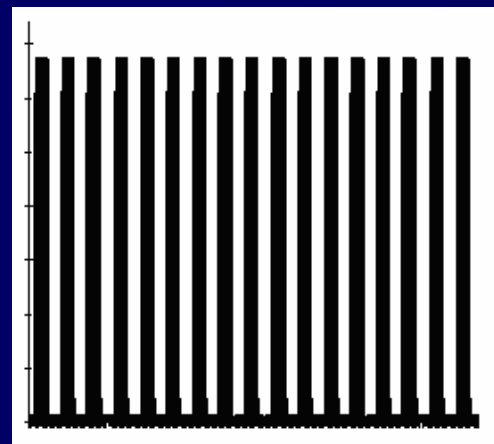
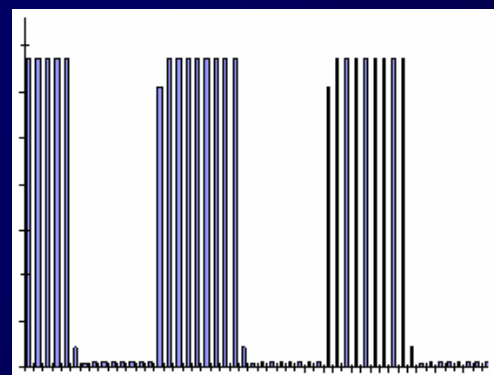


Fig. 1: SOA in Nonlinear loop Mirror

The operation of the circulating shift register can be described by a schematic diagram in Fig. 1, which consists of an SOA in a nonlinear optical loop mirror (NOLM) with feedback arranged in such a way that the reflected signal returns to the SOA as a control pulse. If the reflected signals are amplified and polarisation rotated, and fed back into the loop as a control pulse, a circulating shift register function is obtained. The simulated result is shown in Fig. 2.



(a)



(b)

Fig.2: Output from Shift Register: (a) Large scale and (b) Small scale

Discussion & Conclusion

In this project, an all-optical circulating shift register has been demonstrated. It shows that all pulses are either completely switched or unswitched. The block length can be calculated base on the feedback length. The circulating shift register can be a basic building block for other applications such as optical memory and clock division.