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A Study on the Applications of Nonlinear Optical Loop Mirror (NOLM) in Optical Communications

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This paper discusses on the applications of Nonlinear Optical Loop Mirror (NOLM) in Optical Communications. NOLM is a simple device, made of a coupler whose output ports are connected through a span of fiber, offers a versatile way in optical fiber communications. A NOLM can be used for applications like Optical switching, De-Multiplexing, Passive Mode Locking, Pulse Shaping, Filtering, Optical Buffer, Add-drop Multiplexer (ADM), implementing Logic Gates, among others. The splitting ratio in NOLM, if not exactly 50:50, it is possible to make pulse compression which can be used for sending the signal for longer distance. NOLM can be used as Comb-Filter by inserting a piece of Polarization Maintaining Fiber (PMF) within the loop. This Comb-Filter can be used for generating multi wavelength fiber laser. Optical Sensor can also be produced using a Comb-Filter. By using Wavelength Division Multiplexing (WDM) coupler(s) in a NOLM, logic gates like OR, AND, X-OR, etc can also be developed. These logic gates can be used for all optical signal processing. All of these devices work in optical domain which is a lot faster then electrical domain. Simulations on NOLM based devices for different applications have also been performed using MATLAB.