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Cross phase modulation induced depolarization of a probe signal and its impact on polarization mode dispersion compensators

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<p>Nonlinear effects are easily observed in single mode optical fibres because of the fibre small spot size and extreme low loss. At high optical intensities in fibres the refractive index becomes a function of the intensity of the optical signal. This refractive index is known as the Kerr nonlinearity. This leads to the optical Kerr effect where the nonlinear phase shift induced by an intense high power pump changes the characteristics of the probe beam. Cross phase modulation (XPM) refers to a nonlinear effect where a pump beam with high intensity changes the phase of a low power probe beam. In this work, we consider the composite problem of polarization mode dispersion (PMD) and XPM in wavelength division multiplexing (WDM) networks. PMD continues to pose a treat to high speed optical networks hence the need for PMD compensators (PMDCs). PMDCs monitor the link PMD in an indirect manner where a popular monitoring technique tracks the degree of polarization (DOP) of a signal in the link. It can be shown that in a two channel WDM system an intensity modulated pump modulates the state of polarization (SOP) of a probe signal at the pump bit rate. In this work we experimentally demonstrate the depolarization of a probe signal in the presence of an intensity modulated pump signal. The results show that minimum interaction between the pump and probe signal occur when the pump and probe input Stokes vectors are parallel and anti-parallel. Hence the probe signal incurs maximum depolarization when the two signals are arranged in an orthogonal configuration. These results are crucial to PMDC because the source of the DOP degradation may mislead the compensator.

Level (Hons, MSc,
   PhD, other)?

PhD

Consider for a student
   award (Yes / No)?

No

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

No

Primary author: Mr GAMATHAM, Romeo (Nelson Mandela Metropolitan University)

Co-authors: Prof. LEICTH, Andrew (Nelson Mandela Metropolitan University); Dr GIBBON, Timothy (Nelson Mandela Metropolitan University)

Presenter: Dr GIBBON, Timothy (Nelson Mandela Metropolitan University)

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