

SCHOOL OF ENGINEERING

FINAL REPORT

SIMULATION OF THE IMPACT OF CHROMATIC DISPERSION AND PMD COMPENSATION ON THE SYSTEM LIMITATION DUE TO PMD

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Abstract

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Optical communications has experienced a rapid development during the last decade. Fiber optic-communication systems are capable of transmitting high data rates over long distances. More bandwidth can be acquired by decreasing the spacing of the optical channels or by increasing the data rate. Characterization of the optical components and active monitoring of the network calls for accurate measurement methods. The objective of this project is to investigate the measurement method which measures the important parameters of the components used in optical communications. Chromatic dispersion of optical fibers of the laser transmitters set limits for the data rate and transmission distance. Measurements of dispersion have traditionally been performed using a phase-shift method. When high modulation frequencies are applied to achieve high resolution, an error could be introduced. In this project, the measurement accuracy of this method is analyzed for estimating the accuracy and of measurement result is developed. Chromatic dispersion and polarization mode dispersion (PMD) are major impairments of long distance transport at higher bit-rates. To overcome the limitations posed by dispersion, compensation techniques have to be adopted.