



Student Researcher: Hui Zhu

Faculty Mentor: Dr. Christi K. Madsen

Department of Electrical Engineering
Texas A&M University

Optical Delay-line Measurement

Abstract

OVERVIEW: Telecommunication networks based on optical fiber technology have become a major information-transmission system over the past two decades. With its electromagnetic immunity and low energy loss advantages, fiber optic is now being widely implemented in many types of devices in different fields of study. However, knowing the relative delay between two optical paths is critical when setting up any optical fiber interferometers.

STUDENT PROJECT: The objective of this project is to build a system capable of measuring the phase difference between the test path and the reference path based on the technique called modulation phase-shift method. Compared to the conventional lock-in amplifier for audio frequencies set up, this approach has much faster phase sensitive detection ability. However, a number of factors such as polarization dependence and bias of the equipments do need to be taken into consideration in the delay-line system. This approach of measurement can achieve many orders of magnitude improvement in bandwidth and speed over the conventional method mentioned above. Therefore it opens up many measurement possibilities, such as characterizing tunable optical devices and tracking swept-wavelength sources.