

Abstract

With many advantages compared to traditional sensors, optical fiber sensors have been studied and applied to many different areas.

Interferometric sensors are one of the most useful sensor types due to their high sensitivities. Two Separated Arms and In-line optical interferometric sensors received further attention because of compactness and robustness.

In this thesis , design of strain sensors by using two methods of MZM, two Separated Arms MZM and in-line MZM. The in-line MZM is simple and lower cost than separated arms MZM, this in-line MZM is designed by splicing SMF with MMF. Four lengths of MMF have been used which are (90mm, 80mm, 70mm and 50mm).Weights from (50 to 2000) g are used and placed on MMF. The sensitivity calculated of these MMF length have been (7.6pm/ $\mu\epsilon$, 6.15pm/ $\mu\epsilon$, 5.45pm/ $\mu\epsilon$ and 4.615pm/ $\mu\epsilon$) respectively, best sensitivity was obtained with length of MMF is 90 mm.

The experimental results shows that the two separated arms method in the MZM is more sensitive than the in-line MZM, which is (0.315pm/pa) for two separated arms and (0.09 pm/pa) for the in-line MZM. The sensitivity and reading testes for both methods was performed and reported in this thesis.