

## ***ABSTRACT***

The purpose of this work is to investigate the possibilities of employing speckle patterns alterations, to be noticed in an emerging light spot from step index multimode optical fiber, due to outer perturbation for sensing purposes. The first order moment statistical feature is used to design the optical fiber sensors of statistical mode. The experiments of optical fiber sensor of statistical mode are performed for different applied weights and the related images were captured by using a CCD camera. First moment statistical feature is taken out from these images after suitable image processing. Variations in speckle patterns were noticed when applying 12 weights each one weighing 500 gm on a fiber optic in which beams of He-Ne laser were propagating. To achieve the application of effective weight on the fiber optic, a section of load application which has some number of ridges from (3-5) positioned between two parallel flat plates was employed. The obtained results illustrated that, when fiber optic was positioned, so that corrugation of bending was made by the applying part of load, (by means of ridges), and when loads were applied on the optical fiber, the difference in first order moment increased as weight was applied. The effect of area size of contact between fiber optic and ridges was set by, employing some different preparations for the application section of load. With these results, and by using statistical mode feature, it was assured that, speckles observation in a light spot emerging from a fiber optic can be used for sensing the load applied on this fiber. For enhancement of load application effects, appropriate arrangements were used with ridges having convenient dimensions (3mm, 5mm and 7mm) which are alternately organized against the fiber optic.