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Interference fringe intensity measurement by optical path length variation using Michelson's interferometer

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Abstract :

We report on experimental work carried out using Michelson's Interferometer. In materials morphology, the difference between reference and sample beam optical path lengths in an Optical Coherence Tomography (OCT) setup can be used to extract internal structure information of optically dispersive media. Hence the interferometry experiments presented, form a foundation upon which modelling and setting up of a Michelson mode OCT setup is structured. A Mathematica® model of the electric field superposition is presented in the form of intensity plots at the interferometer output. A Helium-Neon laser and traditional Sodium lamp were used in this work. The interferometer was aligned and used to measure the refractive index of a gas cell which was gradually evacuated and the fringe shift corresponding to the optical path difference in the movable mirror arm of the interferometer measured. Results of change in gas refractive index against pressure were plotted. Additionally, a computation of the Sodium doublet separation was performed in order to approach the Zero Path Difference (ZPD) condition required for white light interferometry. Electronic presentation and measurement of the fringe patterns is also presented in two and three-dimensional plots.

Award :

Yes

Level :

MSc

Supervisor :

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Paper :

No

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