

Development of high speed, high resolution interference microscopy systems and their applications

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Abstract

Phase shift interference (PSI) is widely used technique for topographical characterization of surfaces. However, PSI based techniques suffer from an inherent problem called 'phase wrapping'. Phase wrapping limits these systems to sample topographies that present smaller variations than a single fringe – which translates to half of the illumination source's wavelength. This limitation may be addressed by sophisticated phase unwrapping algorithms which are time consuming or by a much simpler approach of multi-wavelength illumination. Once this limitation is lifted, there is another issue to be addressed – the inability to distinguish if measured height changes are induced by actual height variations or by changes in the optical or structural properties of the sample (called surface variability). The main goal of this research is to address these issues.