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Τίτλος

«High resolution optical topography»

Σταματίνα Βλάχου

Μεταπτυχιακή Φοιτήτρια

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Abstract:

Surface topography is an important aspect of materials science and engineering research with applications ranging from coatings, tribology, engineered or structured surfaces, to traceology of archaeological surfaces. Using portable, non-invasive high resolution techniques, which enable in-line measurements, is advantageous in many of these applications. Furthermore, the ability to perform rapid, high repetition rate measurements is a prerequisite for studying the temporal evolution of minute topographic changes.

For this purpose a portable optical profilometer based on interferometry was designed and developed. By studying the spectral modulation, which results from the interference of white light reflected from the sample's surface and a reference surface, we are able to retrieve the surface profile along a line without using any moving parts. As we demonstrate our profilometer can perform measurements, at a rate that exceeds 170 fps, with a resolution better that 10 nm in the longitudinal direction (80 dB dynamic measurement range) and 8 μm in the transverse over a field of 3 mm. By measuring a variety of surfaces we show that spectral interferometry is a powerful, nondestructive technique ideal for performing rapid, high-resolution measurements of both smooth and abrupt surface variations with no restrictions in the surface hardness.