

The application of phase-shifting technique in surface topographic measurement

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Surface topographic measurement plays an increasingly significant role in optical measurement, such as automatic visual inspection, ultra-precision manufacturing and other fields. The latest hard drives and optical instruments require the chips with ultra-precision surfaces, as well as the corresponding detecting technique to carry out online measurement and monitor the relevant parameters. The phase-shifting interferometry is one of the most widely applied techniques of which the principle is introducing time modulation into the phase difference of two beams of coherent light. By the photoelectric detector the phase can be demodulated from the interference pattern via considerable phase-unwrapping algorithms. However, the inevitable noise leads to the error and distortion of several points in the phase diagram.

We propose a K-means clustering unwrapping algorithm for the error reduction. Based on "bad points" to avoid the path integral, our algorithm can complete the three-dimensional morphology online. Compared with the traditional algorithms which might result in failure to unwrap when the reference points happen to be

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