

Fringe Pattern Analysis: Some Results and Discussions (III)

Kemao Qian

School of Computer Engineering, Nanyang Technological University, Singapore.

*Corresponding Author: Kemao Qian. Email: mkmqian@ntu.edu.sg.

Fringe-based measurement techniques provide an accurate, straightforward and convenient means for optical metrology and experimental mechanics [1]. Consequently, fringe pattern analysis is an important issue. We have reported our works in this conference in 2011 [2] and 2014 [3]. In this paper, our recent developments since 2014 are introduced, as listed below:

1. Among various fringe patterns, carrier fringe is more convenient to use but more difficult to characterize. We unified several prominent carrier fringe analysis techniques for deeper understanding. The background removal and the influence of high-order harmonics are also studied.
2. Moving fringe analysis techniques from methodology to real applications, one big issue is that the specimens are often discontinuous. If the discontinuity is simple, a segmentation-based method was proposed to segment the entire structure into pieces for individual analysis. If the discontinuity is more complicated, temporal methods are more practical. A new gray-code design was proposed as one such example.
3. Recently, machine learning becomes a hot topic. We scrutinize the machine learning applications in denoising and phase unwrapping, and discuss the results.
4. We also briefly introduce the computation acceleration in fringe analysis and beyond [4].

Based on above results, it is further discussed whether a general solution with scientific significance or a specific solution with particular suitability should be developed.

References

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