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Abstract
We develop a phase measurement system that has capabilities of phase unwrapping, real-time, and long-term monitoring based on the NI (National Instruments) LabVIEW platform. The measurements of phase-drift caused by a photorefractive effect in a lithium niobium phase modulator were performed in the proposed instrument. According to the systematic test on measurement stability, we prove that the measurement system can automatically detect the phase variations. Moreover, the photorefractive characteristics of metallic titanium and zinc in-diffused phase modulators were evaluated afterward. The results show that the photorefractive stability of zinc in-diffused phase modulators is better than that of titanium in-diffused phase modulators. Finally, it is successful to measuring the phase drift caused by photorefractive in phase modulator using the developed instrument.

In addition, the multi-channel measurement platform also successfully demonstrated based on the high expansion of LabVIEW software. For instance: two-channel and three-channel phase measurement systems. In the two-channel system, it can measure phase-retardation variations of a reflected light from the surface of a device under test with heating or without heating conditions. Besides, the photorefractive stability of a phase modulator can be monitored during measurement period. Meanwhile, the phase retardations and amplitudes between horizontal and perpendicular polarizations can be obtained using the three-channel measurement system.

This study offers a measurement platform with flexibility on the system expansion and integration, which can provide more applications of optical metrology in the near future.
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