

Study on Angle Measurement Interferometer around Any Axis Direction Selected by Transmissive Liquid Crystal Device

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Abstract : Generally, the optical interferometer system is too complicated and difficult to change the measurement items, pitch, yaw, and roll, etc. In this article, the optical interferometer system using the transmissive Liquid Crystal Device (LCD) as the switch of the optical path was proposed. At first, the normal optical interferometer, Michelson interferometer, was constructed to measure the pitch angle and the yaw angle. In this optical interferometer, the ball lenses with the refractive indices of 2.0 were used as the retroreflectors. After that, the transmissive LCD was introduced as the switch to select the adequate optical path. In this article, these optical systems were constructed. Pitch measurement interferometer and yaw measurement interferometer were switched by the transmissive LCD. When the LCD was open for the yaw measurement, the yaw was sufficiently measured and optical path for the pitch measurement was blocked. On the other hand, when the LCD was open for the pitch measurement, the pitch was measured and the optical path for the yaw measurement was also blocked. In this article, the results of both of pitch measurement and yaw measurement were shown, and the result of blocked yaw measurement and pitch measurement were shown. As this measurement system was based on Michelson interferometer, the other measuring items, the deviation along the optical axis, the vertical deviation to the optical axis and roll angle, could be measured by the additional ball lenses and the additional switching in future work.

Keywords : any direction angle, ball lens, laser interferometer, transmissive liquid crystal device

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