Multi time sequence flashing laser test for high frequency swing mirror

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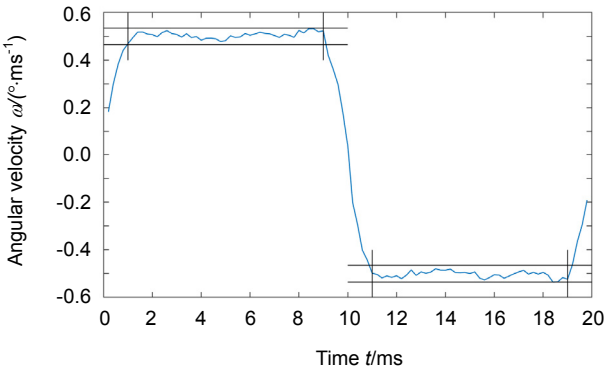

Measurement value of angular velocity for swing mirror 50 Hz

Overview: The angular velocity of swing mirror and its uniformity have an important influence on the working quality of the system. Some research institutions have studied the angle measurement of the swing mirror. But for the dynamic swing mirror, especially the high frequency swing mirror, because of the CCD frame rate, the common test system cannot meet the requirement of high sampling rate in the measurement process. In order to solve the problem of low sampling rate in current swing mirror detection system, a multi time series high accuracy non-contact detection system for swing mirror is designed, which is based on the principle of equivalent sampling.

In the measuring system, when the laser is reflected by the swing mirror, a light spot is obtained on the receiving screen. The position of the spot moves with the swing of the swing mirror. The angle of the swing mirror is calculated by the position of the laser spot, and the angular velocity is obtained according to the adjacent angles and the interval time. In order to adapt to high frequency swing mirror, we realized flashing laser lighting with the designed laser pulse control circuit to replace the camera exposure time in the general measurement systems with the laser pulse duration, and acquired the separate light spot images by adjusting the laser spot size and the pulse cycle. At the same time, in order to improve the sampling rate of the system, we used time sequence logic control circuit to generate multi time pulse signal and achieve the equivalent sampling, so as to improve the sampling rate of the system and meet the test demands.

In order to confirm the feasibility of the test method, the test system was set up and was used to test the swing mirror at different working frequencies. The experimental results show that the angle resolution of the detection system is 0.005°. The time resolution can reach the microsecond order, and the angular velocity measurement error on different frequencies is less than ±7%. In summary, we believe this system and method can improve the sampling rate of the swing mirror measurement and have the adjustable sampling frequency can meet the dynamic non-contact measurement requirements with high frequency angular speed and amplitude and other parameters under different working frequencies.

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