Error analysis of spatial amplitude modulation spectropolarimeter prototype

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As a new spectropolarimetric detection technology developed in recent years [1–3], spatial amplitude modulation spectropolarimetric detection technology uses double combo wedges to modulate polarization information on the vertical spatial dimension which is perpendicular to spectral dispersion direction, so as to obtain the polarization information and spectral information of the detected target simultaneously, the main advantage of such system is that we will not have any moving element. In order to study the measurement accuracy and error factors of the prototype of spatial amplitude modulation spectropolarimeter, according to the principle of spatial amplitude modulation spectral polarization detection and its measurement equation, the influence of the non-ideal error of the device and the installation error of the system on the polarization measurement is analyzed theoretically by using the control variable method. The relationship between the relative error between the actual outgoing light intensity and the true value and the birefringence error of the wedged material, the machining error of the wedged angle, the azimuth error of the polarizer and the installation error of the optical axis in the center of the optical wedges are obtained. Based on the measured results of the prototype, combined with the theoretical analysis and demodulation results, the error sources that affect the polarization demodulation accuracy of the prototype are analyzed. The analysis results provide a theoretical basis for the improvement and error correction of the prototype of spatial amplitude modulation spectropolarimeter.

References

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