

A NEW POLARIMETER FOR STELLAR POLARISATION MEASUREMENT

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ABSTRACT. A polarimeter for the measurement of Stokes' parameters for stellar and quasi stellar objects in specific wavelength regions has been reported. The variable retardation and dispersive property of a small angle Babinet Compensator has been exploited for such measurement. The theoretical basis of the method is given in detail.

1. INTRODUCTION

Multi element detector arrays like CCD, IPCS, IDS, etc., have given a new dimension to astronomical instrumentation. CCDs with high quantum efficiency, low read out noise and small pixel size ($\sim 10\text{--}15\mu$) have become available. Such CCDs are finding their place at the detector end in many astronomical instruments. These have been successfully used in polarimeters enabling many spectral and spatial elements to be observed simultaneously. The Babinet Compensator has been known as a sensitive device for measurement of small phase changes in polarised light. It has been shown that with suitable precautions¹ the minimum detectable phase change² may be made as low as 2π milli radian. CCDs coupled to a Babinet Compensator-polariser combination in a specified manner can provide a convenient means of measuring four Stokes' parameters separately in very narrow wavelength intervals simultaneously for a considerably large wavelength range.

2. THEORY

Fig. 1 shows the optical set up for the polarimeter. When a babinet Compensator having a small wedge angle is placed in the path of a polarised collimated beam followed by an

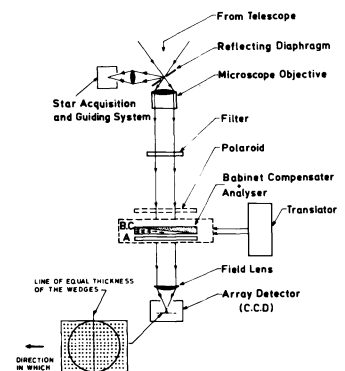


Fig. 1. OPTICAL ARRANGEMENT OF THE POLARIMETER

3. REMARKS

1. Approach is simple with no movement required for any component during observation
2. Simultaneously it can give all four Stokes' parameters for a reasonably large wavelength range.
3. Correction for defects in the optical polarising elements can be done in the reduction process.

REFERENCES

1. Pandya, T.P. and Saxena, A.K. *KOB Ser A* 2, pp 107 (1978)
2. Jerrard, H.G. *J. Opt. Soc. Am.* 39, pp 1031, (1949)