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CONSIDERATION OF IR PHASE-SHIFTING INTERFEROMETRIC SYSTEM FOR TESTING ASTRONOMICAL ASPHERIC MIRROR IN CHINA

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ABSTRACT

This paper describes a plan of a new IR phace-shfting interferometric system for testing astronomical aspheric mirror which has big departure from the best fit reference sphere during fine grinding. In this experimental system, some new technology will be adopted. The accuracy of system can reach $\lambda/40(\lambda=10.6\mu m)$

I. INTRODUTION

With the diameter of modern astronomical telescope increasing, the small f-ratio of aspheric mirror which has big deparuture from the best fit reference sphere will be adopted in order to reduce the cost of telescope.

It is difficult for polishing a asphric mirror which has a big deparature from the best fit reference sphere. The best way to solve this problem is to obtain the aspheric surface during fine grinding with finer grades of abrasive until polishing is feasible. However, conventional interferometric testing in the visible spectrum can not be applied to the rough surface during fine grinding. Therefore, a $10.6\mu m$ IR interferometer and infrared null lens will be used to monitor the figure during fine grinding until the figure is in the range of the visible interferometer.

NanJing astronomical instruments research center will establish a phase-shifting IR interferometric system (ϕ=40mm) for testing astronomical aspheric mirror during fine grinding.

II. GENERAL LAYOUT AND FUNCTIONAL DIAGRAM OF IR PHASE-SHIFTING INTERFEROMETRIC SYSTEM

Figure 1 and Figure 2 show schematic and functional diagram of IR phase-shifting interferomeric system respectively.

III. KEY TECHNOLOGY

In this system, some key technology as follows will be adopted:

1)phase-shifting modulation method

2)the over-lapping averaging 4-frame algorithm

3)the spatial carrier heterodyne interferometry for measuring PZT displacement

4)a novel phase-shifting algorithm

IV. CONCLUSION

We will make experiments to compare different methods, then a better method will be adopted to establish IR phase-shifting interfernmetric system for testing astronomical aspheric mirror.

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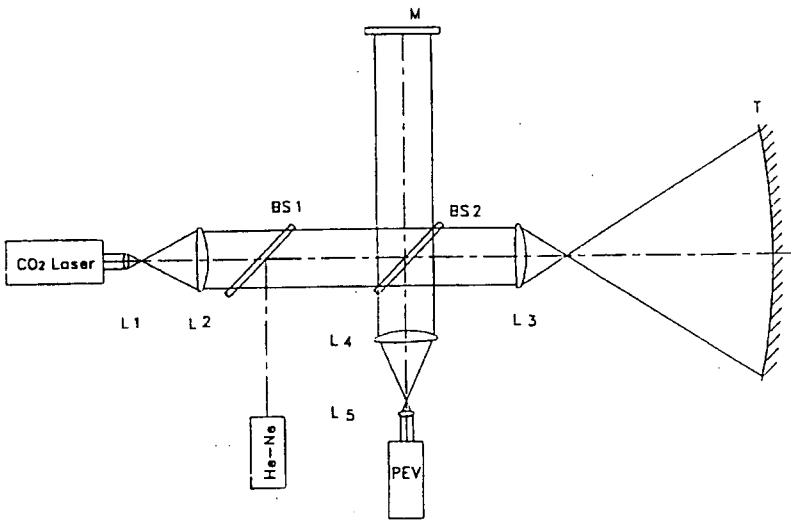

Fig. 1.— Optical layout of IR phase-shifting interferometer. Lenses: L_1, L_2, L_4, L_5 (Ge); Flat mirror: M; Lens: L (BaF); Tested mirror : T; Beamsplitters: BS_1 (Ge), BS_2 (BaF_2)

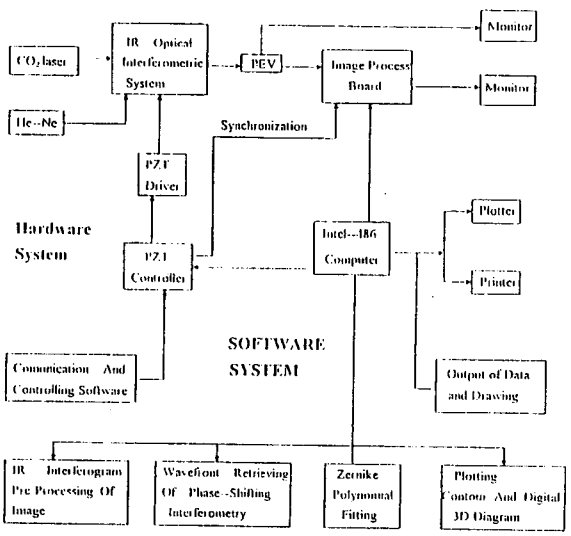

Fig. 2.— system Funtional Diagram Of IR Phase-Shifting Interferometer