OBSERVING PROGRAMS FOR THE PULKOVO HORIZONTAL MERIDIAN CIRCLE

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ABSTRACT. Observing programs are discussed for the Pułkovo automatic horizontal meridian circle. The instrument is highly efficient and yields precise and accurate positions. We prepare an observing program of faint FK5 stars with the aim of improving on the system of this catalogue and also prepare a program of observations of IRS reference catalogue stars.

1. INTRODUCTION

It appears that the accuracy of positions and proper motions of some stars included in the FK5 will be lower then that of the stars in the FK4. It is expected that proper motion of faint stars will have standard errors of about 0".25/100 yrs (Schwan 1986). Hence, unlike the basic FK5 which contains the stars from FK4, the FK4 Supp. and the N30, the extended part (MC II) in the FK5 reguires re-observation on a uniform instrumental system with the aim of improving on the system of the FK5 as a whole, improving the homogeneity of this catalogue and bringing the average positions from 1940 to more recent dates.

2. CAPABILITIES OF THE HORIZONTAL MERIDIAN CIRCLE (HMC)

After automation of the HMC in 1986 we started regular automatic observations of positions on this instrument, cf. Gumerov et al.(1986). The precision of a single right ascension observation corresponds to a standard error of $0^s.011 \sec\delta$ and in declination to 0".20 sec Z. The investigations showed the collimation to be stable (0".004/1°C); the instrument's system is stable in time and with temperature in right ascension and declination; the flexure of the HMC is determined by the shape of the reflecting mirror and not by the deformations due to its weight as was

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the case with classical meridian instruments. In general, after hairing made test observations, we are confident that stellar coordinates on this instrument will be determined accurate to $0''.05_m$ (Kirijan et al.1984; Pinigin et al. 1974). Stars up to 11^m may be observed and it takes one and half minute to observe a star and reduce the data. During an 8-hour night one can thus observe up to 300 stars.

3. OBSERVING PROGRAMS

Altogether 2400 stars have been included into the observing programs for improving the positions of faint FK5 stars: FK4 stars $4^m \div 7^m$, FK4 Supp., stars from the FKSZ, radio stars and AGK3 reference stars near radio sources. We can observe the whole declination zone from +90° to -10°.

We expected to make about 20000 observations per year on the HMC assuming there will be 600 clear night hours. We can thus observe each star on the list nine to ten times for two years. The precision of a derived position will then correspond to a standard error of 0".07, the systematic error is expected to be in the order of 0".05.

The effects of the instrumental parameters must be more closely studied and corrected for. The necessity to relate observations made with two HMC tubes through the common zenith zone of ±10° present an additional difficulty.

The refraction corrections are derived from 104 FK4 stars observed at both culminations. Orange filters are used for correction for the chromatic refraction and reduction to a uniform color system.

We also intend to observe the IRS stars; their positions are in need of improvement. The expected precision of a star's position corresponds to a standard error 0".1. There is a chance that we might observe the IRS list not only differentialy but also by the absolute method.

In conclusion we note that observations on highly accurate automatic ground-based meridian circles in different countries will improve the precision of the celestial reference system in the nearest future to correspond to errors in the order 0".015 (Høg 1980).

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DISCUSSION

de Vegt: What is the elevation of the HMC above the ground?

Pinigin: 6 to 7 meters.

Yoshizawa: How many stars do you observe during one night?

Pinigin: We can observe 300 stars per night.

Hoeg: What is your limiting magnitude?

Pinigin: Visual magnitude 11.

Hughes: What is the limiting magnitude of this instrument? Is the prism the aperture stop?

Pinigin: Around sixth magnitude.