

ON $\Delta\delta_\alpha$ SYSTEMATIC ERRORS OF THE FK5

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An estimation of $\Delta\delta_\alpha$ systematic errors of the FK5 has been made. Systematic differences between the FK5 and FK4 and $\Delta\delta_\alpha$ corrections to the FK4 derived at Pulkovo have been used as given in the following series: $\Delta\delta_\alpha = A' \sin \alpha + B' \cos \alpha + C' \sin 2\alpha + D' \cos 2\alpha$.

The present paper is based on the use of the $\Delta\delta_\alpha$ correction to the FK4 (Kosin 1989). It was derived with the use of observations with the photographic zenith tube (PZT) and zenith telescope (ZT). The results of the observations with these instruments (derived on the basis of the chain adjustment of the PZT catalogue and half-sum of declinations of pair stars in the case of the ZT) are free from $\Delta\delta_\alpha$ errors. AGK3 and a differential (in the FK4 system) catalogue of star declinations on PZT and ZT programmes observed with the Vertical Circle at Pulkovo have been used as intermediate catalogues for our comparison. The FK4 $\Delta\delta_\alpha$ correction (for the epoch close to 1964) is

$$\Delta\delta_\alpha (\text{FK4}) = 0''.022 \sin \alpha - 0''.040 \cos \alpha - 0''.018 \sin 2\alpha .$$

A comparison of the FK5 and the FK4 has been made on the basis of the data and recommendations of the Astronomisches Rechen Institut (Heidelberg, FRG). The difference for the zone $+20^\circ$ to $+70^\circ$ and the above-mentioned epoch has proven to be $\text{FK5} - \text{FK4} = 0''.002 \sin \alpha - 0''.028 \cos \alpha - 0''.002 \sin 2\alpha - 0''.009 \cos 2\alpha$.

The following two expressions have been compared for a determination of the FK5 correction:

$$\begin{aligned} \text{PZT(ZT)} - \text{FK4} &= 0''.022 \sin \alpha - 0''.040 \cos \alpha - 0''.018 \sin 2\alpha \\ \text{FK5} - \text{FK4} &= 0''.002 \sin \alpha - 0''.028 \cos \alpha - 0''.002 \sin 2\alpha - 0''.009 \cos 2\alpha . \end{aligned}$$

Their difference is the correction in question:

$$\Delta\delta_\alpha (\text{FK5}) = 0''.020 \sin \alpha - 0''.012 \cos \alpha - 0''.016 \sin 2\alpha + 0''.009 \cos 2\alpha .$$

References

Kosin, G.S.: 1989, "A determination of FK4 Systematic Errors $\Delta\delta_\alpha$ ", *Izvestia Gl. Astr. Obs. Pulkovo*, **206**, 3–5 (in Russian).

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