ON THE CREATION OF A NEW CATALOGUE FOR USSR TIME SERVICE

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The R.A. system KSV [1] has been used in the USSR Time Service for observations with small transit instruments since 1970. Some methodological errors were made when creating the KSV [2] and the use of the proper motion system, distorted with the position errors of GC and KSV [3], make it necessary to improve the KSV system. Work on the creation of a new system KSV-2 was organized for this purpose. The catalogue included about 0.3 million computer-readable observations with small transit instruments of the USSR Time Service with mean standard deviations $\sigma = 11$ sec δ ms.

Sixteen individual catalogues have been constructed. In the process of this work the same methods were used for the recalculation of the original, checked and corrected material and for the adjustment of the observational results [4]. Besides the classical free chain adjustment of non-group observations there was used the total adjustment of all these series by the least squares method.

The following matrix was used:

$$(\Delta\alpha_i - \Delta\alpha_k) + \Delta a_j (A_k - A_i) = \Delta U_{ik,j} \mid P_{ik,j}$$

if $\Sigma \Delta\alpha_i = 0$. Here $\Delta U_{ik,j} = \Delta U_{ij} - \Delta U_{kj}$ for all the star pairs (i,k) on one night (j) and for all the nights of the series. Also, $P_{ik,j} = P_{ik} * P_j$, $P_{ik} = P_i * P_k / (P_i + P_k)$, $P_i = \sigma^2 / \sigma_i^2$ are weights of stars, σ^2 is the general dispersion of zenith stars of these series, $P_j = n_j$ are weights of the dates. The results obtained proved to be similar in the range of the free chain method applicability for both methods.

An analysis of the KSV errors $\Delta\alpha_\alpha$, derived on the basis of various catalogues shows the presence of a noticeable (unstable as a rule from year to year) seasonal influence on the observations with some transit instruments. A magnitude equation of the KSV (about 1 ms per 1 ph. mag.) and an insignificant dependence on the spectral class of the stars have been found.

J. H. Lieske and V. K. Abalakin (eds.), Inertial Coordinate System on the Sky, 81–82.

A preliminary estimation of the R.A. system KSV is given in the Figure for the declination from 50° to 75°. The comparisons of the KSV with FK4 and FK5 for the same zone are given also.

It is easily seen that the KSV keeps better pace with modern observational data than the FK4 or even the FK5. This situation is unlikely to be changed in the near future, until a new reference frame is constructed by astrocosmic means. After the correcions for the above mentioned errors [2, 3] the KSV system practically coincides with the KSV-2.

Hence, we can make a conclusion that the small transit instrument observations can be effectively used for a construction of an independent coordinate system, especially after the organisation of star group observations, the inclusion of observations of stars at two culminations and the solar system bodies by all instruments, and coordination of observation programmes by different stations. The KSV-2 system is a good such independent coordinate system and would not require any improvement after the correction of proper motions.

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