COMPARISON OF PROPER MOTIONS OF STARS FROM AGK3 AND SPECIAL COMPILED CATALOGUE IN REGIONS WITH GALAXIES

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ABSTRACT. The procedure of construction of special compiled catalogue is presented. The compiled catalogue is based on 6 catalogues obtained following the KSZ plan. The mean error of proper motions of stars is ±0".009 per year. AGK3 proper motions compared with those in the compiled catalogue yield precession corrections $\Delta k = -0".0046 \pm 0".0010$, $\Delta n = +0".0045 \pm 0".0010$. Systematic differences between these catalogues are represented by a series development using products of Hermite polynomials, Legendre polynomials and Fourier terms.

The determination of absolute proper motions of stars with respect to galaxies plays an important part in the approximation of an inertial system. Proper motion programmes using galaxies as reference frame are in progress at several observatories.

There are comprehensive catalogues of proper motions compiled at Moscow, Tashkent, Pulkovo and Goloseevo following the KSZ plan (Deutsch, 1952). Since the Soviet programme is carried out by several observatories it is a good opportunity to combine individual catalogues in a general system (Rybka,1980).

The Special Compiled Catalogue (SCC) is based on 6 individual catalogues. Specially selected distribution of sky areas in the compiled catalogue is optimum for the determination of corrections to the precession values. It may also reduce the residual magnitude equation errors originating from their investigation by statistical method (Rybka, 1985).

The resulting compiled catalogue for 21817 stars with magnitudes 8^m -$15^m.5$ for 75 sky fields was completed in the declination zone from +60° to –2°. The average rms error of an individual SCC proper motion is ±0".009. The SCC provides a data base for studies in the fields of stellar kinematics and astrometry. This paper presents first results based on SCC proper motions.

The differences between AGK3 proper motions and those in SCC were examined for corrections to the precession. There is a sample of 894 AGK3 stars in the compiled catalogue.

Results for precessional values are $\Delta k = -0".0046 \pm 0".0010$, $\Delta n = +0".0045 \pm 0".0010$. The computed quantities do not significally differ from values derived by Asteriadis from AGK3 proper motions

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($\Delta k = -0''.0036 \pm 0''.0002$, $\Delta n = +0''.0044 \pm 0''.0002$) and by du Mont from the Lick Pilot proper motion programme ($\Delta k = -0''.0034 \pm 0''.0011$. $\Delta n = +0''.0038 \pm 0''.0006$).

Besides the above investigation other systematic errors were analysed in order to provide the linkage between AGK3 and SCC systems. They were performed with the new analytical method developed at Heidelberg. The spherical harmonics were replaced by products of Hermite polynomials, Legendre polynomials and Fourier terms. Using transformed declinations these types of functions are much more suited for modelling systematic differences between catalogues under considerations.

Only significant terms of series development were analysed. The F-test and γ-test with 1 % significance level were used for this purpose. The resulting systematic differences between AGK3 and SCC catalogues depend on Right Ascension and Declination and do not depend on the magnitude of stars.

The largest systematic differences occure in proper motions in Declination, especially in the declination zone from 0° to 30°. The root mean square difference in Declination is $0''.054 \pm 0''.0016$ and in Right Ascension is $0''.0037 \pm 0''.0016$.

The above results of analysis of differences of proper motions of stars given in AGK3 and SCC catalogues may be used for the connection between these systems within the sky areas covered with SCC catalogue.

References

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