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A DIFFERENTIAL CATALOG OF RIGHT ASCENSIONS FOR 578 STARS RRS2 OBTAINED FROM OBSERVATIONS WITH THE MERIDIAN CIRCLE AT ODESSA ASTRONOMICAL OBSERVATORY IN 1990–1993

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Meridian observations of stars according to programs which are of great interest for other branches of astronomy is a tradition of Odessa Astronomical Observatory. One of these programs is RRS2 – Radio References Stars. Their precise positions are necessary to establish a connection between the radio and optical systems of celestial coordinates (CONFOR program). In 1990–1993, over 10000 differential observations of right ascensions for RRS2 stars were obtained in the FK5 system with the meridian circle. A catalogue of right ascensions of 520 RRS2 stars was compiled with a 0.010 sec ms error of the catalogue position. This catalogue was sent to Astronomical Observatory of Kiev University for the inclusion in a summary catalogue.

KEY WORDS Astrometry, radio reference star, catalogues

Meridian observations of stars according to programs which are of great interest for other branches of astronomy (stellar astronomy, astrophysics and radio astrometry) are traditional for Odessa Astronomical Observatory. The meridian Repsold circle ($d = 135$ mm, $F = 1980$ mm, magn. 200, ocular micrometer visual) is a classical instrument of fundamental astrometry; systematic observations with it have been carried out for over 50 years. The instrument is described in detail by Novopashenny [1] and Volyanskaya *et al.* [2]. A Meridian transit of a star is recorded by means of the electronics system developed and designed by Genovsky [3].

The meridian circle was used for conducting the meridian part of the CONFOR program (RRS2 list [4]) in order to establish connection between the radio and optical coordinate systems [5]. To connect the radio interferometric coordinate system with the fundamental one of optical coordinates it is necessary to determine coordinates of extragalactic radio sources (15–18 magn.) in the system of a fundamental catalogue (e.g. FK5) which contains, as a rule, a limited number of stars brighter than 6 magn.

The problem is solved in several stages, the first one consisting of measurements of stellar coordinates to 9 mag near radio sources (RRS2 program) in the FK5 system, by meridian astrometry methods.

Measurements of right ascensions for stars to 9 mag in areas with extragalactic sources, declinations from -20 to $+45$ degrees (with gravity center near the equatorial zone from -10 to $+10$ degrees) were carried out with the meridian circle at Odessa Astronomical Observatory starting from March 1990. Stars of the FK5 catalogue were observed as reference stars. Although the stars were observed from a comparatively large meridian arc during the whole nights, the main principle of the differential determination of coordinates was taken into account: the reduction of observed stars to the reference catalogue should be made by using narrow zones. Observations and their processing were carried out according to the Instruction [6]. Totally, over 10,000 differential observations of the program and reference star right ascensions were made in 1990–1993 within 240 nights.

Apparent positions of the stars observed were initially calculated by researchers of the Astrometry Department of Astronomy Observatory, Kiev University, to whom the authors extend their gratitude. Later, we used a code for computing apparent stellar positions developed by Zhukov [7].

From observational results, a catalogue was compiled of right ascensions of 578 stars RRS2 for equinox J2000.0 epoch of observation, comprising rms error of 0.010s per position (obtained from inner consistency). The catalogue was sent to Astronomical Observatory of Kiev University for the inclusion in a summary catalogue of stars RRS2.

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