LONGITUDE NETWORK AND CELESTIAL REFERENCE FRAME

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Abstract. Three actual problems in the determination of longitudes and longitudes network, for which there were no completely satisfying theoretical solutions up to now, have been considered in the dissertation. The determination of longitudes and longitude differences, also plays an important role in the construction of the future Yugoslav astrogeodetic network, so that the acuteness of the considered tasks is even greater.

The first problem that was solved is the investigation of the mathematical model for the adjustment of observation in the longitude determination. In the dissertation have been investigated 12 mathematical models (3 functional and each with 4 stochasical), and among them the best mathematical model has been found, which even in comparison with existing Wende's model yields a considerably better agreement with the observational data.

The second actual problem considered in the dissertation is the agreement of the accuracy of the results for the obtained longitudes and longitude differences by use of two different celestial reference frames: dynamical, given by the positions and proper motions of the FK5-Catalogue stars and kinematical, given by the positions and proper motions of the HIPPARCOS-Catalogue stars. In answer to this question, it has been established that the two mentioned celestial reference frames have considerably different influence on the longitude determination, while at the same time, the longitude differences are free of this influence for the same observational plan.

All solutions in both research tasks, in the mathematical model of adjustment and in the comparison of the two celestial reference frames, have been checked and confirmed on a very extensive observational material (around 20 000 measurements) of the 1988 campaign for the European Longitude Network (ELN) of the Bavarian Academy of Science.

For the third problem considered in this dissertation - the inclusion of the Belgrade Astronomical Observatory (BAO) in the European Longitude Network - 4 mathematical models have been investigated and it has been found that with a high reliability and satisfying precision, BAO could be included in ELN with the determination of longitude differences with only two stations of the ELN network.

In the solving of all the three considered problems the modern data-reduction theory has been used.