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High energy photon source surface network survey

In order to speed up the construction progress of high energy photon source (HEPS) and realize installation in sections, it is necessary to carry out the surface network survey in the early stage of civil construction. The first time surface network survey included the GPS survey to obtain the horizontal coordinates and the levelling survey to obtain the elevation values. For the GPS survey, static observations were made on 17 control points of high energy photon source, in total 6 periods were observed, and a simple unconstrained adjustment was made each for each period to check the observation quality. For the levelling survey, there are 36 levelling routes and carried out 72 roundtrip measurements. GPS observation data and levelling data were sorted out and adjusted. For the levelling data adjustment, a single-point was used as a constraint and the accuracy of the result is 0.35 mm. For the GPS data adjustment, a site correction constrains adjustment method was applied and the planar coordinates of the surface network were obtained with an accuracy of 1.64 mm. The plane and elevation adjustment results together formed the first time survey result of HEPS surface network. The second time surface network survey was carried out two years after the first time survey, and some control points were found moved.

The second time surface network survey was mainly carried out by using GPS and total station. GPS static measurement was performed on 8 permanent points which distributed in the linac, booster so and the storage ring, in total 14 periods were observed. The total station measurement work includes these eight permanent points plus one more temporary point. centered upon COSA and Vector adjustment software were used for processing the total station observations. LGO and TBC were used for unconstrained adjustment of the GPS data. The closure error of GPS unconstrained adjustment closed loop is 7.594 mm, the standard deviation of points in horizontal is 0.935 mm and in elevation is 0.719 mm separately. The adjustment results of GPS and total station are consistent with each other.

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