Deformation Measurements on Obruk Dam Precise Leveling Method

Engin Gülal, Tamer Baybura, Kayhan Aladoğan, Mehmet Nurullah Alkan and Veli Ilçi (Turkey)

Key words: Deformation measurement; "Obruk Dam; " "deformation analysis; " "vertical deformations; " "precise leveling; " "panda deformation analysis; "

SUMMARY

This study was carried out in order to determine the possible vertical deformations that could occur in and around the Obruk Dam. The Obruk Dam, which is located between the provinces of Oguzlar and Dodurga within the Çorum province borders, was built for irrigation and energy purposes on Kızılırmak. The dam was a semi-permeable earth fill with clay core and was constructed between 1996-2007. The basin of the dam, which has a height of 125 meters, is 12830 dam3, the volume of the lake in normal water level is 661 hm3, and the lake is 50 km2. The installed capacity of the hydroelectric power plant is 203 MW and the annual energy production is 473 GWh.

There are a total of 44 object points, 9 on the upstream side of the dam and 35 on the downstream side of the dam body and 6 height control points around it. There are no horizontal coordinates of 6 height points, but these points are only used for relative height measurements. TOPCON DL-503 nivo and invar staff were used with 58 points, with the measuring accuracy of 0.8 mm/km. The network was designed with forward-backward loops. The standard deviation value was calculated from the difference between these measurements and loop closures within 1 km round trip measure. The error limit is 4ï*f*–S with these observations. The total leveling network length is approximately 12 km. First period measurements were made in April of 2016, second period measurements in July of 2016 and third period measurements in November of 2016, and the standard deviation value obtained from the balance network results of these three period measurements was calculated as 0.5 mm on average. After the necessary checks, the leveling net is freely balanced according to the least squares method. The PANDA(Package for the Adjustment of geodetic Networks and Deformation Analysis) program was used to evaluate balancing and measurement.