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Strain Analysis in Horizontal Geodetic Network of Dams for Control of Stability and Monitoring Deformation

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Dams as one of the engineering structures play very important role in human life. Because, from primary human needs such as providing drinking water to professional needs such as water powerhouse creation in order to provide power for industrial centers, hospitals, manufactures and agriculture, have considerable dependent on dams. In addition destruction of a dam can be as dangerous as earthquake. Therefore maintenance, stability control and monitoring deformation of them is indispensable.
In order to control stability of dams and their around lands and monitoring deformation a network is created by surveyor, geologist and dam experts on crest and body of dam or on land near the dam. Geodetic observations are done in this network by precise surveying instrument in deferent time then by using linear least square parametric adjustment method, adjusted coordinates with their variance- covariance matrix and error ellipses, redundancy numbers for observation, blunders and ... are estimated in each epoch. Then displacement vectors are computed in each point of network, After that by use of Lagrangeian deformation idea and constitution of deformation equations movement, displacement model is determined and strain tensor is computed. we can induce deformation information from strain tensor in different ways such as strain ellipse then interpret deformation that happen in each point of network. Also we can compute rigid rotation from anti-symmetric part of displacement gradient tensor.
After processing tow consequence epochs observations of horzontal geodetic network of Hnna dam in southwest of Esfahan, the most semi-major axis of error ellipse is estimated about 0.9mm for point D10, largest displacement is 1.4mm for point C3 that it's semimajor axis of displacement error ellipse is 1.3mm and there is different shear in all of network points exceptional points D2,C3 and C2. There is different dilatation in most of points. These amount of maximum shear and dilatation are justified because of horizontal displacement and subsidence of dam due to pressure of water that conserve behind it.

Key word: strain tensor, monitoring deformation, Geodetic network, deformation equation movement, error ellipse, strain ellipse, shear, dilatation