

# Prediction of Dam Deformation Using Kalman filter Technique

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**Key words:** Deformation measurement; GNSS/GPS;

## SUMMARY

**ABSTRACT** In Dam Deformation Monitoring, repeated observations are carried out to determine either relative or absolute deformation of the Dam Structure. In some instances, factors beyond the control of the observer or instrument may make it impossible to obtain reliable results continuously. In such cases, it may become necessary to resort to some other means of predicting the expected deformation at some future date. Advances in GNSS Technology have increased the potentials for real time monitoring of structures. Time dependent monitoring of the structures can be carried out using kinematic and dynamic models in the results analysis. Such time and position dependent measurements can be processed using the Kalman Filter equation. The Kalman filter equation estimates measurement parameters using time updates and measurement update equations. The time update equation predicts the results for the next epoch measurement while the measurement update equation serves as correction equation for the next step of the deformation measurement epoch. In this study, Kalman Filtering technique was used in predicting current estimates of Dam deformation using two previous measurements, carried out in 2007 and 2008 respectively. The Kalman filter equation was then used to estimate velocity and acceleration of the Dam object from where coordinates and coordinates changes were estimated for 2009, 2010, 2011 and 2012 respectively. Analysis of the results indicated that there is a correlation between the measurement update results and the predicted deformation results. It can therefore be concluded that the Kalman Filter equation can be used to fill in gaps in deformation measurement where continuous monitoring may not be possible. Key Words: Kalman Filter, Deformation, GNSS, Continuous Monitoring, Kinematic