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Abstract:

Hydrostatic-season-time model (HST) are commonly used by engineers to assess dam safety. The model predicts deformations by considering the effects of temperatures in terms of seasonal function, water level fluctuation and time. However, the non-necessity of real temperature measurements and the non-linear relationship between dependent and influencing variables represent a limit. Recently, researchers developed a new one-dimensional analytical model which gives more accurate estimation of thermal field in concrete dams than those obtained through numerical models or the Stucky and Derron method. From that, in this work we tried to improve HST model by correcting the thermal component. Two terms extracted from the analytical model were added to the HST model making it more sensitive to the daily variation of air and water temperatures variations, the first one simulates deformations induced by solar radiation, rainfall and long wave radiation, while the second term assume water temperature effect. The performance of the proposed model was tested using displacements data recorded on six pendulums installed at Tichy Haf arch dam located in north Algeria during five years. The root means square error (RMSE) and the mean absolute error (MAE) indices indicated that the improved model provided better results than the traditional one.

Key words: Arch dam ; HST model ; Concrete temperature ; Statistical model ; Analytical model ; Solar radiation

Available from :

1-https://link.springer.com/chapter/10.1007/978-981-15-9121-1_5

2-https://www.researchgate.net/profile/Roman-Rak-2/publication/347600355_Analysis_of_VIN_Errors_in_Information_Systems_Causes_Consequences_and_Solutions/links/616eece53d9af67ad738e099/Analysis-of-VIN-Errors-in-Information-Systems-Causes-Consequences-and-Solutions.pdf#page=75

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