IJG> Vol.3 No.3, July 2012

OPEN ACCESS

Prediction of Concrete Faced Rock Fill Dams Settlements Using Genetic Programming Algorithm

PDF (Size:711KB) PP. 601-609 DOI: 10.4236/ijg.2012.33060

Author(s)

Seyed Morteza Marandi, Seyed Mahmood VaeziNejad, Elyas Khavari

ABSTRACT

In the present study a Genetic Programing model (*GP*) proposed for the prediction of relative crest settlement of concrete faced rock fill dams. To this end information of 30 large dams constructed in seven countries across the world is gathered with their reported settlements. The results showed that the *GP* model is able to estimate the dam settlement properly based on four properties, void ratio of dam ' s body (*e*), height (*H*), vertical deformation modulus (E_v) and shape factor (*Sc*) of the dam. For verification of the model applicability, obtained results compared with other research methods such as Clements ' s formula and the finite element model. The comparison showed that in all cases the *GP* model led to be more accurate than those of performed in literature. Also a proper compatibility between the *GP* model and the finite element model was perceived.

KEYWORDS

Concrete Faced Rock-Fill Dams; Settlement; Genetic Programming Algorithm; Finite Element Model

Cite this paper

S. Marandi, S. VaeziNejad and E. Khavari, "Prediction of Concrete Faced Rock Fill Dams Settlements Using Genetic Programming Algorithm," *International Journal of Geosciences*, Vol. 3 No. 3, 2012, pp. 601-609. doi: 10.4236/ijg.2012.33060.

References

[1] G. Hunter and R. Fell, "The Deformation Behavior of Rokfill," Uniciv. Report No. 405, The University of New South Wales, Sydney, 2002.

[2] F. Saboya, R. Barosa and A. Vasconcelos, "The Influence of the Left Abutment Geometry on the Behaviour of Xingo Rock-fill Dam," Proceedings of the International Symposium on Concrete Faced Rock-fill Dams, Beijing, 18 September 2000, pp. 565-572.

[3] G. F. Sowers, R. C. Williams and T. S Wallace, "Compressibliity of Broken Rock and the Settlement of Rockfills," Proceedings of the 6th International Conference on Soil Mechanics and Foundation Engineering, Toronto, Vol. 2, 1965, pp. 561-565.

[4] F. L. Lawton and M. D. Lester, "Settlement of Rockfill Dams," Proceedings of the 8th International Congress on Large Dams, Edinburgh, Vol. 3, 1964, pp. 599-613.

[5] C. Soydemir and B. Kjaernsli, "Deformations of Membrane-Faced Rockfill Dams," Proceedings of the 7th European Conference on Soil Mechanics and Foundation Engineering, Brighton, Vol. 3, 1979, pp. 281-284.

[6] R. P. Clements, "Post-Construction Deformation of Rockfill Dams," Journal of Geotechnical Engineering, Vol. 110, No. 7, 1984, pp. 821-840.doi:10.1061/(ASCE)0733-9410(1984)110:7(821)

[7] M. D. Fitzpatrick, B. A. Cole, F. L. Kinstler and B. P. Knoop, "Design of Concrete-Faced Rockfill Dams," In: J. B. Cooke and J. L. Shererd, Eds., Concrete Face Rockfill Dams-Design, Construction, and Performance, 1985, pp. 410-434.

• Open Special Issues
• Published Special Issues
• Special Issues Guideline

IJG Subscription

Most popular papers in IJG

About IJG News

Frequently Asked Questions

Recommend to Peers

Recommend to Library

Contact Us

[8] N. L. S. Pinto and P. L. M. Filho, "Estimating the Maximum Face Slab Deflection in CFRDs," Hydropower & Dams, Vol. 5, No. 6, 1998, pp. 28-30.

[9] P. Han-Gyu, S. Min-Woo, K. Yong-Soeng, and L. Heiu- Dae, "Settlement Behavior Characteristics of CFRD in Construction Period-Case of Daegok Dam," Journal of the KGS, Vol. 21, No. 7, 2005, pp. 91-105.

[10] N. Kovacevic, "Numerical Analyses of Rockfill Dams, Cut Slopes and Road Embankments," Ph.D. Thesis, Imperial College of Science, Technology and Medicine, London, 1994.

[11] J. M. Duncan, "State of the Art: Static Stability and Deformation Analysis," ASCE Geotechnical Special Publication, Vol. 1, No. 31, 1992, pp. 222-266.

[12] J. M. Duncan, "State of the Art: Limit Equilibrium and Finite-Element Analysis of Slopes," ASC.E Journal of Geotechnical Engineering, Vol. 122, No. 7, 1996, pp. 577-595.doi:10.1061/(ASCE)0733-9410(1996)122:7(577)

[13] Y. S. Kim and B. T. Kim, "Prediction of Relative Crest Settlement of Concrete-Faced Rockfill Dams Analyzed Using an Artificial Neural Network Model," Computers and Geotechnics, Vol. 35, No. 1,