World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Reliability Analysis of Dam under Quicksand Condition

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Abstract : This paper focuses on the analysis of quicksand condition for a dam foundation. The quicksand condition occurs in cohesion less soil when effective stress of soil becomes zero. In a dam, the saturated sediment may appear quite solid until a sudden change in pressure or shock initiates liquefaction. This causes the sand to form a suspension and lose strength hence resulting in failure of dam. A soil profile shows different properties at different points and the values obtained are uncertain thus reliability analysis is performed. The reliability is defined as probability of safety of a system in a given environment and loading condition and it is assessed as Reliability Index. The reliability analysis of dams under quicksand condition is carried by Gaussian Process Regression (GPR). Reliability index and factor of safety relating to liquefaction of soil is analysed using GPR. The results of reliability analysis by GPR is compared to that of conventional method and it is demonstrated that on applying GPR the probabilistic analysis reduces the computational time and efforts.

Keywords : factor of safety, GPR, reliability index, quicksand
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020