

## Parameter Identification Analysis in the Design of Rock Fill Dams

**Authors :** G. Shahzadi, A. Soulaïmani

**Abstract :** This research work aims to identify the physical parameters of the constitutive soil model in the design of a rockfill dam by inverse analysis. The best parameters of the constitutive soil model, are those that minimize the objective function, defined as the difference between the measured and numerical results. The Finite Element code (Plaxis) has been utilized for numerical simulation. Polynomial and neural network-based response surfaces have been generated to analyze the relationship between soil parameters and displacements. The performance of surrogate models has been analyzed and compared by evaluating the root mean square error. A comparative study has been done based on objective functions and optimization techniques. Objective functions are categorized by considering measured data with and without uncertainty in instruments, defined by the least square method, which estimates the norm between the predicted displacements and the measured values. Hydro Quebec provided data sets for the measured values of the Romaine-2 dam. Stochastic optimization, an approach that can overcome local minima, and solve non-convex and non-differentiable problems with ease, is used to obtain an optimum value. Genetic Algorithm (GA), Particle Swarm Optimization (PSO) and Differential Evolution (DE) are compared for the minimization problem, although all these techniques take time to converge to an optimum value; however, PSO provided the better convergence and best soil parameters. Overall, parameter identification analysis could be effectively used for the rockfill dam application and has the potential to become a valuable tool for geotechnical engineers for assessing dam performance and dam safety.

**Keywords :** Rockfill dam, parameter identification, stochastic analysis, regression, PLAXIS

**Conference Title :** ICGGE 2020 : International Conference on Geomechanics and Geotechnical Engineering

**Conference Location :** Zurich, Switzerland

**Conference Dates :** July 27-28, 2020