



# Prediction of cement grout penetration by geostatistical method

Ali Johari \* , Aslan Jalilnejad Hallajian

1. Shiraz University of Technology, johari@sutech.ac.ir
2. Shiraz University of Technology, a.jalilnejad@sutech.ac.ir

## Abstract

This paper presents a stochastically approach for validating the cement grouting in soil which is a crucial matter for stabilization in soil structures, by geostatistics method. In this way a real site is considered and four boreholes are drilled in there and the soil parameters are determined. After that the cement grout is penetrated in the boreholes and the density of the soil is measured by getting the sample from grouting distance. After that the traveled distance of grouting is determining by geostatistical methods. Comparison of the results show a close distance for two methods. Therefore, the geostatistical method can be used for predicting the traveled distance of grout instead of field test.

**Key words:** Grouting, Permeability, Geostatistics Analysis, Borehole

## 1. Introduction

Grouting is a useful and effective method, which is widely used in geotechnical engineering for various purposes, such as reducing the settlement and increasing the bearing capacity of the foundations, supporting open and underground excavations, and constructing water cutoffs for dams [1]. Grouting is a procedure involving grout injection into fissures, discontinuities, voids and cavities in soil or rock formation in order to improve their properties, especially to reduce permeability and increase the strength and modulus of the formations [2-3]. The grout penetrates into fractures and voids and thus spreads in rock mass [4]. However, because it is impossible to observe the dam foundation and the entrance of grout into the voids and fractures, this technology is frequently described as more of an art than a science [5]. Jet grouting starts with drilling a borehole, to the required lower end of the section to be treated. In a single fluid system, the fluid injected is grout. This system is used mainly for horizontal jet grouting, for example, in tunnel support systems [6]. Several studies have been made for determining the methods and ability of grouting. Some recent investigations are described in this paper.

Li et al.[7] studied on the time variant equations of grout viscosity at different volumetric ratios and their results reveals that the diffusion of cement grouts and fast curing grouts are U shaped and asymmetric elliptical. Coulter and Martin,[8] carried a laboratory program to