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## ***Review of Stabilization Methods with Different Admixtures for Soft Soils***

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### **Abstract**

Soil stabilization by admixture was developed in Japan during 1970s and 1980s. The treated soil has greater strength, reduced compressibility and lower hydraulic conductivity than the original soil. The original technique known internationally as the deep mixing method (DMM) was developed simultaneously in Sweden and Japan in the mid-1970s. It is an in-situ soil treatment technology whereby the soil is blended with cementitious and/or other materials. Grouting with chemical binder/s (sodium silicate, acrylamide, N-methylol acrylamide, polyurethane epoxy resins, amino-plasts, phenol-plasts, and lingo-sulfonates) is the effective method to improve the soil properties. The choice of a particular method and chemical for soil stabilization will depend upon many factors like, soil type and layering, magnitude of the load, situation and type of the project purpose, soil strength desired, toxicity and rheology.

**Keywords:** Jet grouting, Chemical grouting, Deep mixing method, Stabilization.

## **1. INTRODUCTION**

Soil stabilization is defined as a technique to improve the engineering characteristics in order to improve the parameters such as shear strength, compressibility, density, hydraulic conductivity. The techniques of soil stabilization can be classified into a number of categories such as vibration, surcharge load, structural reinforcement improvement by structural fill, admixtures, and grouting and other methods. There are many techniques that can be used for different purposes by enhancing some aspects of soil behavior and improve the strength and properties of soil [1]. The important features of ground treatment includes: improving the bearing capacity of the ground, reducing the potential for total and differential settlement, reducing the time during which the settlement take place, reducing potential for liquefaction in saturated fine sand or hydraulic fills, reducing the hydraulic conductivity of the ground, removing or excluding water from the ground. The conventional method of soil improvement is to replace the soft soil by suitable imported fill materials. However, this practice is naturally very expensive due to the cost of excavation, dumping and the filling material. This paper aims to review the use of different chemical grout for the stabilization of soft soils.

## **2. SOIL STABILIZATION BY ADMIXTURE**

Soil stabilization by admixture was developed in Japan during 1970 and 1980. It uses rotating mixer shafts, paddles, or jets that penetrate into the ground while injecting and mixing Portland cement or some other stabilizing agent. These techniques include deep cement mixing, soil mix walls, deep mixed method and other. The treated soil has greater strength, reduced compressibility and lower hydraulic conductivity than the original soil [2]. The use of admixture such as lime, cement, oils and bitumen is one of oldest and most widespread method for improving soil. When mixed with soil, it forms a material called soil-cement. The objective of admixture is to provide artificial cementation, thus increasing the strength and reducing both compressibility and hydraulic conductivity. Admixture treated soil also have been used as erosion protection on the face of the earth dams, levees and channels. The disadvantage of this method is that specialized equipment is usually required to achieve a sufficient thorough mixing. If the mixing is inadequate, the resulting product will consist of alternating over treated hard spot separated by untreated soft spot, a situation that may be worse than no treatment at all [3].