# An easy method determining hydraulic conductivity of soils using pore pressure response of Piezocone Penetration Tests

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## 1. Abstract

Hydraulic conductivity is one of the major geotechnical parameters that govern the characteristics of pore water flow in soils. Determination of hydraulic conductivity, however, is traditionally time consuming and expensive. This research proposes the development of an easy and economical way to determine the hydraulic conductivity. The key idea is that the pore pressure response of saturated soils (during perturbation) is not only a function of stress-strain parameters but also a function of hydraulic conductivities. Therefore, a careful analysis of perturbation pore pressure may unveil the hydraulic conductivity information. The high excess pore pressure observed for clayey soils and the low excess pore pressure observed for sandy soils during Piezocone penetration (perturbation) tests exemplify this hypothesis. The analysis of this coupled behavior is not easy; however, recent studies of Song and Voyiadjis (2002, 2004), Song et al. (1999) and Voyiadjis and Song (2000a,b) prove the validity of this key idea.

The works of Song and Voyiadjis (2002, 2004) provide substantially enhanced method for the estimation of the hydraulic conductivity. However, their method is computationally intensive, and it is not easy to use for general geotechnical engineers.

This research preforms numerical studies and investigates the relationships between the excess pore pressure and the hydraulic conductivity of various soils using the works of Song and Voyiadjis (2002, 2004), and present easy-to-use design charts to detour computational difficulties. Results of this study may also be used for new researches that utilize the hydraulic conductivity, such as soil classification, detection of underground aquifers, and seepage analysis, since the results of these researches will be substantially more reliable with the aid of hydraulic conductivity information.