

## **Soil Resistance Estimation using Smart Instrumented Dynamic Penetrometers**

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### **ABSTRACT**

In-situ penetration tests using dynamic penetrometers are widely used for estimating soil resistance. Additionally, these dynamic penetrometers have been instrumented to improve tests accuracy. This paper introduces smart instrumented dynamic penetrometers and discusses experimental studies for various cases. An energy monitoring module was developed to enhance the dynamic penetration tests. The standard penetration test (SPT) and instrumented dynamic cone penetrometer (IDCP) tests were conducted using the energy monitoring module. Dynamic responses obtained by the energy monitoring module were used to calculate the transferred energies into the rod head and tip to correct the evaluation of ground strength. In addition, a crosshole-type dynamic penetrometer (CDP) was developed to measure the penetration index and shear wave velocity simultaneously to estimate the strength and stiffness of ground. The results of this study indicate that smart instrumented dynamic penetrometers may be effectively used to characterize the strength and stiffness of ground.

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