

Transient Electrical Resistivity and Elastic Wave Velocity of Sand-Cement-Inorganic Binder Mixture

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Abstract : The cement milk grout has been used for ground improvement. Due to the environmental issues related to cement, the reduction of cement usage is requesting. In this study, inorganic binder is introduced to reduce the use of cement contents for ground improvement. To evaluate transient electrical and mechanical properties of sand-cement-inorganic binder mixture, two non-destructive testing (NDT) methods, Electrical Resistivity (ER) and Free Free Resonant Column (FFRC) tests were adopted in addition to unconfined compressive strength test. Electrical resistivity, longitudinal wave velocity and damping ratio of sand-cement admixture samples improved with addition of inorganic binders were measured. Experimental tests were performed considering four different mixing ratios and three different cement contents depending on the curing time. Results show that mixing ratio and curing time have considerable effects on electrical and mechanical properties of mixture. Unconfined compressive strength (UCS) decreases as the cement content decreases. However, sufficient grout strength can be obtained with increase of content of inorganic binder. From the results, it is found that the inorganic binder can be used to enhance the mechanical properties of mixture and reduce the cement content. It is expected that data and trends proposed in this study can be used as reference in predicting grouting quality in the field.

Keywords : damping ratio, electrical resistivity, ground improvement, inorganic binder, longitudinal wave velocity, unconfined compression strength

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