CENTRIFUGE MODELING FOR BLAST STUDIES

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Scaled testing is a common practice in many disciplines of civil engineering. However, in geotechnical engineering this technique is often inaccurate due to the non-linear material behavior of soils. As a result, corresponding stresses and strains of the reduced scale test will be quite small due to the incorrect stiffness of the soil. To correct the error, similarity of stress between model and prototype can be achieved by increasing the weight of each particle by an equivalent amount of gravities. This idea led to the development of model testing in a centrifuge. The principles of centrifuge modeling are now widely established and have been documented in detail. A set of scaling laws relates the observed behavior of the models to the prototype structures in the field. The scaling laws reveal some advantages of centrifuge modeling. For example, the scaling law for energy is $1/n^3$. This suggests that by testing a model sand layer with a buried charge of say 1 gram at 100 g represents a blast event that corresponds in the field to 1 million times the event. The paper will discuss the wide range of modeling applications with emphasis on research efforts on blast studies.