

KINEMATICS AND PSEUDO-STATIC ANALYSIS OF FAILURE OF SOIL-NAILED EXCAVATION MODELS IN DYNAMIC CENTRIFUGE TESTS SIMULATING EARTHQUAKE CONDITIONS

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Abstract

Soil nailing is an *in-situ* technique of mechanically stabilizing soil mass with passive inclusions (soil nails) as the excavation proceeds. In spite of its popularity, relatively little is known about the behavior of soil-nailed systems during strong earthquakes. To address this issue, two series of dynamic centrifuge tests on a total of 18 models of soil-nailed excavations was conducted. In these tests the length, spacing, stiffness and inclination of the nails and the stiffness of the facing were varied. The models were cyclically deformed and eventually driven to failure under different levels of horizontal shaking. The scaling factor was 50, with the models corresponding to 7.6 meters high prototype excavations. The behavior of the models was recorded in flight with series of miniature accelerometers, displacement transducers and video cameras. The tests were conducted at the Centrifuge Research Center of the Rensselaer Polytechnic Institute.

The lecture describes the testing procedure, elaborate interpretation and synthesis of all available data, evolution of displacements during shaking and the failure mechanism of several models. It also describes the applicability of pseudo-static analysis in assessing the stability of models under cyclic loads.

