

Seismic response of an embankment on loose sand treated with soil-cement panels: Centrifuge tests and numerical analyses

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Numerical simulations of a centrifuge model test of an embankment dam on a liquefiable foundation layer treated with soil-cement walls are presented. The centrifuge model was tested on a 9-m radius centrifuge and corresponded to a 28 m tall embankment underlain by a 9 m thick saturated loose sand layer. Soil-cement walls were constructed through the loose sand layer over a 30 m long section near the toe of the embankment and covered with a 7.5 m tall berm. The model was shaken with a scaled earthquake having a peak horizontal base acceleration of 0.26 g, followed by a second event with a peak base acceleration of 0.54 g. Both events caused liquefaction in the loose sand layer. Crack detectors indicated that the soil-cement walls sheared through their full length in the second event. The results of the centrifuge model test and two-dimensional nonlinear dynamic simulations are compared. Capabilities and limitations in the two-dimensional simulations of soil-cement grid reinforcement systems, with both liquefaction and soil-cement cracking effects, are discussed. Implications for practice are discussed