

Centrifuge Modeling of Soil Liquefaction of a Pohang Sand Layer During the 2017 Pohang Earthquake

¹Kil-Wan Ko, ¹Dong-Hyeong Choi, ¹Yeon-Jun Kim, ¹Tae-Hyuk Kwon*

¹Department of Civil & Environmental Engineering, KAIST, Daejeon, Korea

Abstract: Evidence of soil liquefaction during the 2017 Pohang earthquake ($M_w = 5.4$) has highlighted the urgent need to reexamine possibility of the soil liquefaction during weak earthquakes. Centrifuge modeling has various advantages not only in readily simulating the ground model, but also in observing large-strain, non-linear behavior at in-situ stress conditions. In this study, to investigate the liquefaction phenomenon in free-field during the Pohang earthquake, dynamic centrifuge tests were performed using saturated sand. Centrifuge tests simulated the free-field in Heunghae-eup where the soil ejecta occurred as the evidence of the liquefaction. The ground models were reconstituted by matching the grain size distribution curve of the soils in Heunghae-eup. The recorded earthquake motion at the old port in Pohang was used as an input motion. The test results showed the excess pore water pressure ratio close to 1.0, as well as the dilation spikes as an evidence of liquefaction in medium-dense sand. Accordingly, this study shows the potential of utilizing dynamic centrifuge tests as an experimental modeling tool for evaluating the soil liquefaction.

Keywords: Soil liquefaction, centrifuge modeling, Pohang earthquake, saturated sand

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* Corresponding author. Email: t.kwon@kaist.ac.kr