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Liquefaction Simulator "Licky" for Science Education

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The phenomenon of soil liquefaction generated by seismic vibration of earthquake in nature is one of the most interesting demonstrations for science education because it illustrates the strange behaviors that go beyond the realm of common sense. The conventional methods for the educational demonstration are not necessarily easy. Hutter introduced a simple experiment for soil liquefaction by the Nohguchi bottle which was a closed plastic bottle filled with water, push-pins and sand developed by Nohguchi[1]. The bottle named *Licky* can easily simulate this phenomenon any time, anywhere and on many occasions. The simulator comprises a closed bottle, fluid, granular material and some push-pins with plastic ball. This simulation is always set up by shaking or turning the bottle upside down to mix the fluid and granular material and by settling the granular material. The liquefaction is generated by giving the bottle a light mechanical shock, and as a result under certain conditions the push-pins completely buried in the granular material partly rise up to the surface of the sediment of the granular material and under other conditions the push-pins standing on the surface of the sediment sink into it. In this paper we introduce the fundamental theory of the law of similarity and the mechanism for setting up this apparatus.

Keywords: soil liquefaction; science education; demonstration.

Reference

[1] Y. Nohguchi, *Rep. Nat. Res. Inst. Earth Science & Disaster Prevention.* **61, 49-53**(2001).